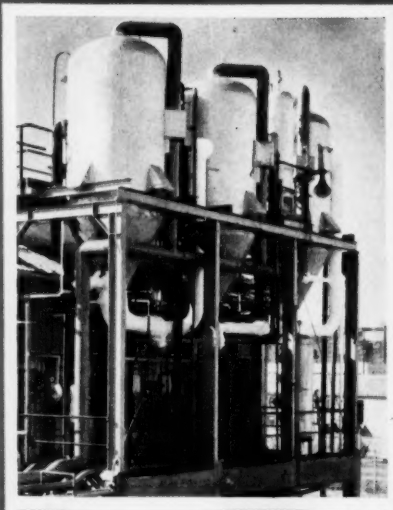
Chemical INDUSTRIES Week

March 31, 1951

Price 35 cents



CIW Report: antihistamines; "cold cure" boom spurs output of little-known intermediates . . . p. 7

Xylenes; output tied to rising benzene production; new uses require isomer separation . . p. 17

CIW Camera tours Warren Paper Company; sees "color" prepared, paper coated . . . . . p. 30

Need for pilot plant trials lessened by mathematics use, better analytical methods . . . . . p. 35

Industry or infantry? Various Government agencies vie for manpower control . . . . . p. 39

A McGRAW-HILL PUBLICATION

For Quality Ammonium and Potassium Products Specify

SOLVAY

TRADE-MARK REG. U. S. PAT. OFF.

AMMONIUM CHLORIDE
AMMONIUM BICARBONATE
CAUSTIC POTASH
POTASSIUM CARBONATE
SODIUM NITRITE

SOLVAY SALES DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

BRANCH SALES OFFICES:
Boston • Charlotte • Chicago • Cincinnati • Cleveland
Detroit • Houston • New Orleans • New York
Philadelphia • Pittsburgh • St. Louis • Syracuse

SOLVAY
Alkalies Chemicals
70 YEARS OF SERVICE
1881 1951

Soda Ash · Caustic Soda · Caustic Potash · Chlorine · Potassium Carbonate · Nytron
Calcium Chloride · Sodium Bicarbonate · Specialty Cleansers · Ammonium Bicarbonate
Sodium Nitrite · Para-dichlorobenzene · Ortho-dichlorobenzene · Monochlorobenzene
Methanol · Ammonium Chloride · Formaldehyde

Chemical Industries Week

March 31, 1951
Volume 68 Number 11

OPINION	2
NEWSLETTER	5
CIW REPORT	7
WHAT'S NEW	17
RESEARCH	27
SPECIALTIES	30
PRODUCTION	35
MARKETS	37
BUSINESS & INDUSTRY	39
BOOKS	45
BOOKLETS	48

PUBLISHER ..... Wallace F. Traendly
EDITORIAL DIRECTOR .... S. D. Kirkpatrick
EDITOR ..... W. Alec Jordan
EXECUTIVE EDITOR .. Richard L. Demmerle
MANAGING EDITOR . Howard C. E. Johnson

ASSOCIATE EDITORS: John J. Craig, Herman W. Zabel. ASSISTANT EDITORS: Joseph Gordon, Ralph R. Schulz. REGIONAL EDITORS: Frank C. Byrnes, Chicago; J. V. Hightower, San Francisco; James A. Lee, Houston. ART EDITOR: Woodfin G. Mizell, Jr. EDITORIAL ASSISTANTS: Donald P. Burke, Theresa Hass, Leona Mahler. DOMESTIC AND FOREIGN NEWS SERVICE: McGraw-Hill News Bureaus in principal cities of the U.S. and throughout the world.

Consulting Editors:

Lawrence W. Bass	Ernest W. Reid
Benjamin T. Brooks	Norman A. Shepard
John V. N. Dorr	Roland P. Soule
Charles R. Downs	Robert L. Taylor

Chemical Industries Week (including Chemical Specialties) is published weekly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. Publication Office: 1309 Noble St., Philadelphia 23, Pa.

Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 18, N.Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.

Subscriptions to Chemical Industries Week are solicited in the chemical and process industries only from management men responsible for corporate affairs, purchasing, sales, marketing, packaging, production, research or chemical functions. Position and company connection must be indicated on subscription order. Address all communications to J. E. Blackburn, Jr., Director of Circulation. Allow ten days for change of address.

Single copies 35¢. Subscription rates — United States and Possessions $5.00 a year; $8.00 for two years; $10.00 for three years. Canada $6.00 a year; $10.00 for two years; $12.00 for three years. Pan American countries $7.00 a year; $11.00 for two years; $14.00 for three years. All other countries $20.00 a year; $30.00 for two years; $40.00 for three years. Entered as second class matter July 15, 1944, at the Post Office at Philadelphia 23, Pa., under the Act of March 3, 1879. Printed in U.S.A. Copyright 1951 by McGraw-Hill Publishing Co., Inc. — All Rights Reserved.

BORAX and BORIC ACID

TECHNICAL • U.S.P. • SPECIAL QUALITY
CRYSTAL • GRANULATED • POWDERED
IMPALPABLE • ANHYDROUS

Sodium Metaborate
Potassium Borate
Ammonium Biborate
Ammonium Pentaborate

PACIFIC COAST BORAX COMPANY
51 MADISON AVENUE, NEW YORK 10, N.Y. • CHICAGO 16 • LOS ANGELES 14

A MESSAGE OF IMPORT

Our import department was set up over 15 years ago to search out dependable sources of supply in foreign countries to serve American Industry. Today, in this period of critical shortage it has become inevitably an increasingly important activity in our overall operations.

Despite the mounting difficulties both here and abroad in maintaining the flow of materials every effort is being made to continue to supplement the domestic supply with urgently needed chemical and related products.

Millmaster Chemical Corporation representatives leave at regular intervals to scour foreign markets. Our London office, staffed by experts in this field, serves as liaison with the continent.

Through these connections abroad, we have succeeded in placing at the disposal of American consumers significant tonnage of various products.

Among these products are:

Ammonium Bifluoride
Ammonium Persulphate
Barium Compounds
Chlorinated Hydrocarbons
Epsom Salts
Fertilizer Ingredients
Lithopone
Potash Carbonate
Potash Chrome Alum
Potash Ferricyanide
Potash Hydroxide
Potash Persulphate
Rutile
Soda Ash
Sodium Hydroxide
Whiting
Zirconium Oxide
Zircon Sand

Millmaster's Import Department is prepared to discuss your requirements for any product where a secondary source may help to alleviate your raw material shortages in the difficult days ahead. A letter, wire or telephone call will bring a prompt response as to whether or not we can be of service. Please address your inquiries to:

IMPORT DEPARTMENT
MILLMASTER CHEMICAL CORPORATION
420 Lexington Avenue New York 17 Lexington 2-5959

MAIL COUPON BELOW

The BETTER the ODOR the BIGGER the SALES!

JUST BACK FROM THE CLEANERS?...

Remember how the telltale odor of cleaning fluids used to cling to your freshly tailored garments and how they had to be thoroughly aired before you could wear them and feel comfortably well groomed? Well, that was before the dry cleaning industry had learned all they now know about masking the unpleasant odor of their chemicals. Pioneering in this and many other technical fields, Fritzsche industrial perfume chemists have gained a wealth of practical "know-how" in the solution of almost every type of odor problem. They can help you with yours!

PLEASE FILL IN AND MAIL

FRITZSCHE BROTHERS, Inc.
76 NINTH AVE., NEW YORK 11, N. Y.

We are interested in ☐ PERFUMES ☐ ODOR NEUTRALIZERS for use in the manufacture of products checked below. What do you recommend?

☐ FORMALDEHYDE ☐ ADHESIVES
☐ CLEANING COMPOUNDS ☐ INK
☐ FUEL OIL ☐ LUBRICATING OILS
☐ SPRAYS ☐ WAXES ☐ PLASTICS
☐ RUBBER ☐ LATEX ☐ LEATHER
☐ PAINTS or LACQUER ☐ TEXTILES
☐ ROOM or ☐ HOSPITAL DEODORANTS
☐ OTHER PRODUCTS: _____

COMPANY: _____
ADDRESS: _____
CITY: _____ STATE: _____
ATTENTION: _____
TITLE: _____

FRITZSCHE Brothers, Inc.
Established 1871
PORT AUTHORITY BUILDING
76 NINTH AVENUE, NEW YORK 11, N. Y.

OPINION . . . . .

TVA Costs

To THE EDITOR: I appreciate your carrying the item on page 8 of the February 24 issue of CHEMICAL INDUSTRIES WEEK to the effect that TVA is holding the line on the price of its ammonium nitrate fertilizer. The latter part of the item—that TVA can hold the line because its costs are not determined by factors that govern private operations—is not entirely accurate.

TVA fertilizer production is on a self-supporting basis. While it is true that there are certain items incurred by TVA in its fertilizer production, the fact remains that the operations are financially self-supporting. Operating costs, including depreciation and an appropriate share of overhead, are more than covered by income from sales of fertilizer. This phase of TVA activity is not supported by Treasury appropriations and taxpayers do not have "to cough up to cover deficits."

NEIL BASS
Chief Conservation Engineer
Tennessee Valley Authority
Knoxville, Tenn.

CIW is obliged to Reader Bass for his clarification of TVA's position. Nonetheless he concedes CIW's point that TVA and private industry don't compete on an item-for-item cost basis.—ED.

Taxing Enterprise

To THE EDITOR: Your article in the February 24, 1951 issue of CHEMICAL INDUSTRIES WEEK discussing the tax problem in Texas is on a subject that is of vital importance to all of the chemical industries doing business in Texas. . . . It may be that the interest by the spokesmen of the chemical industries that you alluded to in your article comes too late.

We have attempted on many occasions to point out to other members of the chemical industries in Texas the serious tax trend that we feel is developing, but apparently to no avail.

You may be familiar with the present tax situation in Texas, but I would like to cover the subject briefly because it is impossible to discuss intelligently any of the present tax bills or the proposed ones . . . without understanding the present tax setup.

Texas has no sales tax or income tax and to date there is little or no effort being made to pass any tax of this nature. The principal source of revenue to the State comes from the taxes on natural resources and excise taxes such as on alcoholic beverages, cigarettes, etc.

A substantial part of the State budget in the past also came from ad valorem tax which was . . . paid by all parties in the State owning real estate and . . . personal property. A recent constitutional amendment has been passed which eliminates the ad valorem tax so far as the State . . . is concerned. The effect of this amendment was not only to delete some $20 million in revenue, but also to eliminate from any appreciable direct taxes a large number of substantial taxpayers such as chemical companies, large retail establishments and other manufacturing concerns, etc.

Natural resource taxes bear more than one-third of the total tax burden. It is now estimated that for the next two years that the State will have a deficit of from $60 million to $110 million. Warnings . . . have been given by our Governor and other leaders . . . that a new tax bill is imminent. . . .

There is a great deal of agitation in Texas to tax the chemical industry. I think this comes from a natural inclination on the part of the representatives in the portions of the State which have no such industries to "stick them that has it;" also a sincere feeling on the part of the industries that are now being taxed that the chemical industries should bear their share of the tax burden, particularly since the repeal of the ad valorem tax; and, third, and in my opinion by far the most important reason, the fact that the chemical industries as a whole have been completely inert so far as the present problem is concerned.

I feel that we have a wonderful story to tell regarding our contributions to the State and actually the important part that we are now playing in meeting its tax burdens. We are not only paying a fair direct tax, but in utilizing the natural resources and services that are subject to tax, we are indirectly paying a large part of the State tax burden under the existing structure.

In conclusion, it would be my opinion that if the governmental officials of the State . . . knew more about what the chemical industry is doing and what it means to Texas, and what it may mean to the future of Texas, they would be less inclined to unduly burden the chemical industry with the type of taxes now proposed.

NAME WITHHELD

CIW thanks its Texas reader, who for obvious reasons prefers that we not publish his or his company's name. —ED.

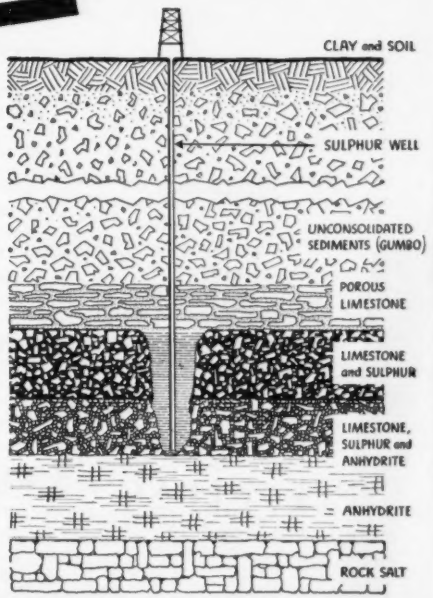
SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

*DEPOSITS . . .

Practically all of the elemental sulphur used in this country comes from mines in Louisiana and Texas.

There, the sulphur deposits occur in the cap rock overlying certain salt domes. The sulphur is mined at depths of 300 to 2,000 feet below the surface. It is melted in place by pumping into the deposit water heated under pressure to a temperature above the melting point of sulphur. The melted sulphur flows away from the limestone and is pumped to the surface where it is allowed to solidify in vats. By such means sulphur nearly 100% pure is produced.



Loading operations at our Newgulf, Texas' mine

TEXAS GULF SULPHUR CO.
INC.

75 East 45th St. New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

KAY-FRIES...

phenylacetic acid

$C_6H_5CH_2COOH$

DATA

While the full potential of *PHENYLACETIC ACID* in synthesis has not been explored, a reactive methylene group has made it a valuable general organic intermediate. It is well-known as a penicillin precursor and has been mentioned as a plant fungicide and hormone. Other suggested uses are as an intermediate for drugs (antispasmodics, sedatives, antiseptics, and anticoagulants); perfume aromatics; and insect repellents.

Kay-Fries also manufactures alkali metal salts of phenylacetic acid, both anhydrous and in solution.

SPECIFICATIONS . . .

purity	**— 99.0% minimum**
melting point	**— 74.5°C. minimum**
ash	**— .05% maximum**
form	**— White flakes**

TYPICAL REACTIONS

Phenylacetic acid undergoes anhydride formation, chlorination to the acid chloride, esterification, amidation, in the normal manner of an organic acid.

condensation

$$C_6H_5CH_2COOH + \underset{\text{benzaldehyde}}{C_6H_5CHO} \xrightarrow{\text{catalyst}} \underset{\text{α-phenylcinnamic acid}}{C_6H_5CH=C(C_6H_5)COOH} + H_2O$$

$$C_6H_5CH_2COONa + \underset{\text{sodium phenyl acetate}}{} + \underset{\text{o-hydroxy-acetophenone}}{C_6H_3(OH)COCH_3} \xrightarrow{\text{catalyst}} \underset{\text{3-phenyl-4-methyl coumarin}}{C_6H_4OCOC(C_6H_5)=C(CH_3)} + NaOH + H_2O$$

reduction

$$C_6H_5CH_2COOH + 3H_2 \xrightarrow{\text{catalyst}} \underset{\text{cyclohexylacetic acid}}{C_6H_{11}CH_2COOH}$$

Varied conditions will give phenylacetaldehyde

For availability and Technical Information please write or phone.

KAY FRIES CHEMICALS INC.

Plant—West Haverstraw, N. Y.

American-British Chemical Supplies, Inc.

Selling Agents For

KAY-FRIES CHEMICALS, INC.

180 Madison Avenue, New York 16, N. Y. MUrray Hill 6-0661

Chemical Industries Week

BUSINESS MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

NEWSLETTER

Celanese Corp. of America will build a multimillion-dollar organic chemicals plant in the Southwest. It will be a modernized version of the firm's present operation at Bishop, Texas.

Shawinigan Chemicals Ltd. is currently evaluating cost data on the process of making phenol and acetone from cumene (isopropylbenzene) via oxidation to the hydroperoxide and cleavage. If final figures on capital and operating costs bear out preliminary data, this process will be the initial venture of the petrochemical firm now being formed by Shawinigan and British-American Oil (CIW Newsletter, March 3, 1951).

Contrary to published rumors, the petrochemical offspring will not produce—for the time being at least—ethyl alcohol or ethylene oxide.

Solvay Process Division is switching from coke to natural gas to provide raw material for its synthetic ammonia plants. Catalytic reforming with steam will convert the gas to synthesis gas. Girdler Corp. has to contract to carry out the job.

Under an amendment to NPA's aluminum order (M-7), fabricators of aluminum will be permitted to use 65% of their base period rate of consumption during the second quarter of 1951. This is the same as the March rate. In a second amendment NPA requires producers of pig and ingot aluminum to supply up to 11½% of their output to independent fabricators holding DO orders.

Liquefied petroleum gas conservation measure: The Munitions Board has asked military installations and industrial plants under military control to use coal as fuel and save LPG for synthetic rubber and high-octane gasoline. A policy memo went out to the three military services:
(1) Natural gas should be used wherever the use of coal is impracticable.
(2) Use of heating and fuel oil should be kept to a minimum.
(3) Use of liquefied petroleum gases should be limited to areas where transportation is no problem.
The Board said that where installations have equipment which can use more than one fuel, arrangements should be made to burn the fuel most readily available in the area with preference to coal, natural gas, and fuel oil, in that order.

Makers of artificial graphite, who use pitch and coke in manufacturing electrodes for electric furnaces and electrolytic anodes for chemical processing plants, fear that a flood of DO orders may bog down delivery of graphite items to defense agencies, because their products are classed as operating supplies under NPA's MRO order.

Representatives of the graphite firms met with NPA officials last week and will meet again next week when the effects of MRO orders will be better known.

More petroleum benzene in the offing: Petroleum Administration for Defense has granted certificates of necessity to Atlas Processing Co., Shreveport, La., for a $2.6 million benzene plant; and to Pan American Petroleum for $1.1 million plant at Texas City, Texas.

Cheaper power for such coal-using industrial centers as Cleveland, Toledo and Niagara Falls moved one step closer to reality this week. A bill giving right of eminent domain for construction of long-distance, coal-carrying conveyors or pipelines has gone through an Ohio State Senate committee, is now before the senate body.

Although rumors have been bruited about that McCarthy Chemical Co.'s plant at Winnie, Texas, would be sold only in a "package deal" together with McCarthy's New Ulm oil field, you can discount that possibility. Latest reports are that negotiations are under way, but for the chemical plant alone.

Closer-to-home supplies of fuel oil for Pacific Northwest states may materialize if a proposal now pending before the Canadian Parliament is approved. Proposal calls for incorporation of Trans Mountain Oil Pipe Line Co., which plans to build a crude oil line from Edmonton, Alberta, to Vancouver, British Columbia.

Preliminary plans call for an initial daily capacity of 75,000 barrels, ultimate throughput of 200,000 barrels. Construction would be completed by the end of 1952. The line may later be extended from Vancouver to the Pacific Northwest states, which now depend largely upon California sources.

New Orleans officials are burned up over Federal power competition. Aluminum Co. of America is weighing that location against the Columbia river valley as the site for its new $45 million reduction plant. The former offers low labor and transportation costs, but the latter can supply below-cost power (from the Bonneville project) 50% cheaper than private Louisiana utilities.

Look for another sulfuric acid plant in the St. Louis area. Reactivation of the Weldon Springs and St. Louis ordinance plants will further tighten an already-tight supply situation. One of the three local producers (Monsanto, General Chemical and American Zinc) will undoubtedly build another plant; and at the moment Monsanto looks like the best bet.

"Rol" is the name tentatively selected by Fels & Co., Philadelphia, for its new liquid household detergent. Marketing plans are still not definite, but bottles and labels have been ordered.

Expect more news within a month on a new Fuller Brush product, Fulsol, a degreaser for household and industrial use. Still in process development, the product will be made at Fuller's Albany, N. Y. plant.

Final report of a committee appointed by the National Research Council to study the effect of disposal at sea of chemical waste products is to be published shortly. The report, based on 3 years' investigation by the Woods Hole Oceanographic Institution, is expected to give essential findings in terms familiar to those concerned with the practical aspects of the problem.

. . . The Editors

PRESCRIPTION ITEMS until a year and a half ago, clearance by the Food and Drug Administration for over-the-counter sale gave a big push to . . .

Antihistamine Drugs

When antihistamines were sold on prescription only for such allergic ills as hay fever and hives, sales were only about $14 million a year.

But over-the-counter promotion of the drugs for the common cold boosted sales to an estimated annual $100 million.

Skyrocketing output is taxing production capacity for many heretofore-scarce and little-used organic intermediates.

Bernard Idson*

Phenomenal sales of antihistaminic drugs mark them as the fastest growing "baby" the pharmaceutical industry has ever known, ranking right alongside the antibiotics, vitamins, sulfonamides and hormones in their commercial impact. This mushroom development is an absorbing medical, chemical and sales story.

Initial prescription sales for treatment of allergies have been dwarfed by the amazing volumes sold for the treatment of the "common cold." Controversy rages as to efficacy, but there is no denying the fact that prior to over-the-counter sales, antihistamines did an annual retail volume of about $14 million. Since their "cold" introduction in November 1949, sales have soared toward an estimated $100 million.

A voluminous literature has evolved. Research from practically every major drug manufacturer has produced thousands of reports evaluating the merits of each one's particular product. New pharmacological or animal-testing techniques have been promulgated for evaluation of the compounds. Rare organic chemicals and rarer organic reactions have been spotlighted, opening new markets and broadening old ones.

The multiplicity of compounds has created virtually hundreds of antihistaminic products. Claims and counterclaims of superiority and individuality by company researchers—and the even more laudatory claims of sales representatives and advertising agencies—have combined to plant confusion in the minds of those not actively engaged in the field.

Why is histamine so important, or why antihistamines? What chemicals go into them? How did the present antihistamines evolve? What are they used for? Do they differ from one another therapeutically? What are their drawbacks? Who's making them? Have any conclusions been reached correlating chemical structure and activity? What production problems came up and how were they licked? How was the merchandising problem handled? These are the questions research and industry had to answer before this report could be written.

HISTAMINE

Hypersensitivity in humans has been recognized since ancient times—witnessed to by such expressions as "One man's meat is another man's poison." Yet allergy cases were recognized as common only in the past fifty years. Although exact figures are not available, incidence of allergy in the United States has been estimated at approximately 7-10% of the population.

The indictment of histamine (β-

* *Polytechnic Institute of Brooklyn, Brooklyn 2, N.Y.*

iminazolylethylamine) as the chemical mediator of most allergic symptoms followed some of the most brilliant "sherlocking" in scientific annals. As the name implies, the predominant property of antihistaminic substances is their ability to counteract histamine.

Histamine is a normal constituent of animal tissue, probably formed by the enzymatic decarboxylation of histidine, an amino acid found in all proteins. It seemed more than mere chance that the greatest amounts of histamine are found in the so-called border cells—i.e., those in direct contact with the outer world—indicating that histamine apparently plays a dominant role as a mediator for certain sensations in the skin, especially in pain and itching.

As a result of cell injuries such as occur during burns, injections of toxins as snake or bee venoms, the symptoms of hay fever, the allergic type of the common cold, and many other forms of allergic manifestations, there is a sudden liberation of toxic amounts of histamine. Present opinion is that extreme sensitization to otherwise harmless substances is associated with a general release of histamine in the blood.

This theory does not explain the entire allergic process. Other substances, which produce symptoms of their own, are liberated as well during cell injury; but histamine is undoubtedly the most important factor, and a substance which nullifies its effects is thus extremely valuable in relieving the symptoms of allergic diseases.

ANTIHISTAMINES

Attempts to reduce histamine effects by raising the tolerance to the poison through gradual doses of histamine itself were of no avail.

Conjugation of histamine with proteins through azo linkages was also ineffective.

Diamine oxidase or histaminase, an enzyme found especially in the kidney and intestine, enjoyed some initially reported success as a destroyer of histamine and was sold under the name "Torantil." Later investigations disproved any positive value.

Several amino acids, including arginine, histidine and cysteine inhibit the characteristic action of histamine; but tremendous amounts are needed. The amino acids are 100,000 to 1,000,000 times less effective than the present synthetic antihistamines.

Over 300 compounds have been tested for activity, but none could be considered a suitable agent for alleviating experimental allergic shock.

Modern antihistaminic history dates from 1933, when Fourneau and Bovet, of the Pasteur Institute, reported that certain phenolic ethers counteracted the action of histamine. The most effective was 2-isopropyl-5-methylphenoxyethyl diethyl amine, known as 929 F.*

Toxicity of the phenolic ethers prompted a search for less harmful compounds. Investigation of a series of ethylene diamines by the same group proved N,N-diethyl-N′-phenyl-N′-ethyl ethylene diamine (1571 F) more active and less toxic. These pioneer researches spurred relatively rapid introduction of the more potent dimethyl homologue of 1571 F (RP 2325).*

Replacement of the N′-ethyl group by benzyl yielded Antergan (RP 2339) which was sufficiently non-toxic to justify the first human trials. This represented, after adrenalin, the first significant step in the chemotherapy of allergic diseases. In spite of its tolerance a number of unpleasant side effects were observed.

In 1944, the Pasteur Institute described Neo-Antergan, N′-(*p*-methoxybenzyl) N′-(2-pyridyl) N,N-dimethyl ethylene diamine. Pharmacological studies showed it to be three times as active as Antergan in human therapy. It remains today as one of the important agents.

French work on Neo-Antergan came as a complete surprise to American investigators at Ciba Pharmaceutical Co., working along the same lines mainly with amido pyridines. Their systematic variation of the substituent radicals of the dimethyl ethylene diamine structure resulted in Pyribenzamine, N,N-dimethyl-N′-benzyl-N′-(2-pyridyl) ethylene diamine. Replacement of the phenyl group in Antergan by 2-pyridyl almost doubled activity.

At about the same time, researchers at the Parke, Davis Laboratories were studying the benzhydryl alkamine ethers. Benadryl, β-dimethylaminoethyl benzhydryl ether, was the most promising. (Experts will recognize similarity of the benzhydryl ethers to the spasmolytic agents and the acetylcholine antagonists of the Trasentin type, which are benzhydryl esters.)

The marked clinical and commercial success of Benadryl and Pyribenzamine loosed the floodgates. Hundreds of compounds were screened. About a score have been offered for clinical use. In contrast to the diversity of their chemical structures, their pharmacological and clinical properties are surprisingly similar and differences are usually quantitative rather than qualitative.

* "F" denotes Fourneau; "RP," Rhone-Poulenc, chemical manufacturers of France.

CHEMISTRY

Basic unit for all effective agents has been the ethylamine skeleton, $R_1X\,CH_2CH_2NR_2$. X may be an oxygen, nitrogen or carbon atom. Recent chemical reviews of antihistamines have evolved these classifications based on chemical constitution.

The majority of the active drugs are alkylene diamines, $R_2N^1CH_2CH_2N^2R_2$, which are broken down into straight or branched chain diamines, cyclic diamines and aminocyclic diamines.

Included in this category are Neo-Antergan (Merck-Rhône-Poulenc), Diatrin (Warner), Foralamin (Eaton), Neohetramine (Nepera), Pyribenzamine (Ciba), Pyrrolazote (Upjohn), Tagathen (Lederle), Thenfadil (Winthrop-Stearns), Histadyl (Lilly) or Thenylene (Abbott), Antistine (Ciba), Perazil (Burroughs-Wellcome) or Di-Paralene (Abbott), and Phenergan (Rhône-Poulenc).

Though minor exceptions exist, active compounds result when both nitrogen atoms of the ethylenediamine chain are completely substituted with organic radicals. For highest activity, one nitrogen usually should be dimethylated and the other should carry an aryl radical and an aralkyl radical.

Maximum effect with aryl radicals has been observed with 2-pyridyl. Phenyl, 3- and 4-pyridyl, picolyl, pyrimidyl, thiazolyl, etc., show less activity.

For the aralkyl radical, the alkyl chain should be a methylene group, whereas the aryl portion may be phenyl, substituted phenyl (especially *p*-halo or *p*-methoxyl), or the isosteric furyl, thienyl, substituted thienyl, etc.

Substitution of a propylene or a branched chain alkylene radical for the ethylene portion results usually in lowered effectiveness.

Terminal cyclic amino groups such as pyrrolidino, piperidino, morpholino, thiomorpholino and 2-imidazolinyl have been substituted for the dimethylamino radicals without serious loss of activity.

Fusion of the aryl and aralkyl portions into a polycyclic ring has been found suitable only in the case of the thiodiphenylamines.

Xanthenes and acridine derivatives are potent but too toxic.

Aminoalkyl ethers or derivatives of ethanolamine, $R_2OCH_2CH_2NR_2$, com-

pose the next broadest category, similarly subdivided into isocyclic aminoalkyl ethers and heterocyclic aminoalkyl ethers.

Ethers of benzhydrol, typified by Benadryl and its *m*-methyl analogue, Toladryl (Parke, Davis), α-methyl benzhydrol as in Decapryn (Merrell) and the 2-benzylphenols (Bristol, Lilly) are the most active examples.

Replacement of phenyl by a 2-thienyl group or bridging of the aromatic rings leads to partial or complete loss of activity. A two-carbon (ethylene) chain is necessary for maximum activity.

Ether linkages appear to contribute to greater sedative properties.

The alkylamines, $R_2CH_2CH_2CH_2NR_2$, where carbon replaces nitrogen or oxygen, are chiefly represented by Trimeton and Chlortrimeton (Schering). Maximum activity is obtained when the nitrogen is dimethylated and the R_2 groups consist of phenyl and 2-pyridyl. Halogenation of the phenyl group in the 4-position produces a large increase in activity yielding probably the most potent antihistamine (Chlortrimeton).

Thephorin (Hoffman-La Roche) is a representative of a novel ring group called pyridindenes which are a fusion of the indene and pyridine rings. The chemical structure leads to its unique property of not causing sedation.

Quaternization of the amino group generally diminishes the antihistamine activity and increases the antispasmodic action. Differences in potency of various salts, such as the hydrochlorides, maleates, tartrates and fumarates, are probably due to increased solubility or absorption.

To offset the drowsiness caused by Benadryl, the hydrochloride of β-dimethylaminoethyl benzhydryl ether, attempts were made by G. D. Searle researchers to combine the ether base with methyl xanthines, selected because of their stimulation of the central nervous system. The low ionization constants of xanthines, leading to unstable salts, was circumvented by use of the more acidic 8-chloro theophylline. The resulting compound's antihistamine value has been overshadowed by its efficacy in motion sicknesses.

RAW MATERIALS

When any relatively complex organic molecule becomes a "volume" item beyond expectation, demand coupled with inadequate production facilities combine to create critical shortages. Raw materials for antihistamine manufacture were no exception—not to mention further curtailments due to the present emphasis on defense production.

The straight or branched chain alkylene diamines, which compose the bulk of the active drugs, are prepared by three routes. An aralkyl halide such as benzyl chloride is condensed in the presence of sodamide with an N,N-dimethyl-N′-aryl ethylene diamine, which is made by the reaction of an aryl amine and N,N-dimethyl aminoethyl chloride.

Benzyl chloride offered no immediate problem, since the technical grade is manufactured by Heyden, Hooker, Monsanto, and Benzol Products; Hooker and Heyden also offer a more refined grade.

Shortly after the antihistamines demonstrated their value in allergies, dimethylaminoethanol appeared commercially from Sharples Chemicals. Carbide and Carbon has since offered it. Michigan Chemical Corporation now offers dimethylaminoethyl chloride and dimethylaminoisopropyl chloride.

Sodium amide is either prepared *in situ* or can be purchased as a powder from Farchan Research Laboratories, Cleveland, or a 90% material in mineral oil from Nepera Chemical Co., Yonkers, N.Y.

Converse of the previous method is such a reaction as that of benzyl amine with N,N-dimethyl-N′-aryl chloride. The aryl amines most needed are aniline, 2-aminopyridine and 2-aminopyrimidine. Aniline offers no particular problem. Many large concerns are leading producers. Reilly Tar and Nepera Chemical had to increase facilities to meet the demand for 2-amino pyridine.

2-Amino pyrimidine is not commercially available and is possibly synthesized by catalytic amination of pyrimidine, or by ammonolysis of the chloropyrimidines at 150-200°. The pyrimidine base is obtained from urea and methyl malonate, conversion to the chloride and reduction, or from methylpseudothiourea and ethyl formylacetate.

Benzylamine is available from Fairmount Chemical and R. W. Greeff.

A third variation for diamine production represents the alkylation of, e.g., benzylaniline with β-dimethylaminoethyl chloride. Benzyl aniline results from benzyl chloride and aniline. Sodium amide or lithium amide are necessary catalysts.

Demand for lithium amide and lithium aluminum hydride has increased over a thousandfold in the past few years. Recent commercial appearance of the amide as an easy-flowing powder, from Metalloy Corp., Minneapolis, made happy many a chemical engineer. It is more easily handled than sodamide, but also more expensive.

If the amides should become short, alkali carbonates can be used where hydrochloric acid is a by-product of a reaction and threatens to kill the yields. It has been noted that, in the absence of a metal amide, secondary amines of the pyridine series and dimethylaminoethylchloride do not give the substituted pyridyl product, but yield practically inactive dihydropyridines.

The method ultimately chosen depends on availability and cost of intermediates and the available equipment.

Where a relatively unstable heterocyclic halide as, for example, furfuryl chloride is a key chemical, it is found advantageous to change the synthesis to use readily available furfural or 5-halo-2-furaldehydes.

It is more suitable to use 2-amino pyridines or pyrimidines than the corresponding chlorides.

The need for thenyl chloride caused Socony-Vacuum, which had been pilot-planting thiophene, to send a good share of its production to antihistamine manufacturers. Chloromethylation gives the desired thenyl chloride. Alternate methods involve the bromination of methyl thiophenes with N-bromosuccinimide, now available from National Aniline and others, or treatment of the alkyl 2-thienyl carbinols with hydrogen bromide in benzene.

Probably the most sorely needed intermediate is anisic aldehyde, necessary for both Neohetramine (Thonzylamine) and Neo-Antergan (Pyranisamine), the two most widely used agents for over-counter sales.

Demand came concurrently with that of synthetic hormones and other non-drug markets, straining the limited production of Du Pont, Dodge & Olcott, Givaudan-Delawanna, Verona Chemical, and others.

Certain antihistamine manufacturers, in need of carload lots in a hurry, were forced to produce it themselves from anisole. An alternate method utilizing anisyl chloride and the corresponding chloromethyl compound was much less practical.

Secondary amines necessary for the ethylene diamine derivatives are best produced by condensing aromatic aldehydes with 2-aminoheterocycles in the presence of formic acid.

Promotion of Antistine (Ciba) for local eye irritations pointed up the need for imidazolines, which can be considered cyclized amidines. Chloro-

acetonitrile, a research chemical derived from chloroacetic acid, is converted to the iminoester and the latter cyclized with ethylene diamine at zero C. The resultant 2-(chloromethyl)-2-imidazoline is then condensed with benzylaniline to give the desired drug.

Perazil (Di-Paralene), offered both by Burroughs-Wellcome and Abbott, necessitated the initial use of anilinopiperazines.

Piperazine is not available in bulk but is relatively easy to prepare (by a route which avoids use of "nitrogen mustards," with their vesicant dangers) from ethylchloroformate, supplied by U. S. Industrial Chemicals. Synthesis of the final benzhydrylmethylpiperazines proceeds from the benzhydrol through the halide and final reaction with methylpiperazine.

Phenothiazine, the base of Pyrrolazote (Upjohn) and Phenergan (Rhône-Poulenc) is readily available from Dow, Du Pont, and the Neville Co., Pittsburgh. It has long been used in veterinary medicine and as an insecticide. The pyrrolidyl compounds for Pyrrolazote manufacture are prepared by hydrogenating pyrrole over Raney nickel and treating the resulting pyrrolidine with ethylene chlorohydrin, the latter supplied by Carbide and Carbon, among others.

Aminoalkyl ethers, represented chiefly by Benadryl (Parke, Davis), Decapryn (Merrell) and the benzyl phenols (Bristol, Lilly) generally result from the interaction of a sodium phenolate with a dialkylaminoalkyl chloride.

Key intermediates for Benadryl manufacture are benzhydryl bromide or benzhydrol, neither obtainable on a large scale. The bromide is prepared by reaction of bromine with the available diphenylmethane (Dow, National Aniline, Verona Chemical), promoted by heat and light.

Benzhydrols are produced by the reduction of benzophenone (Givaudan-Delawanna, American-British Chemical Supplies, Verona, and others) with either aluminum isopropoxide, now available commercially from numerous houses, or zinc dust and alcoholic caustic.

Pyridyl carbinols, specifically α-substituted pyridyl methanols, are the vital intermediates for Decapryn (Merrell). The most convenient preparative route is condensation of pyridine with phenyl methyl ketone in the presence of aluminum or magnesium. The ketone is made by oxidation of Carbide and Carbon's phenyl methyl carbinol. The Grignard reactions first used instead proved difficult in operation.

2-Benzylphenol is the basis for potent antihistamines investigated by both Bristol and Lilly. Pure 2-benzylphenol is readily separated from the mixed benzylphenols in "Santophen 7," sold by Monsanto, by utilizing the water solubility of the barium salt.

Alkylamines, dominated by Trimeton and Chlortrimeton (Schering) are prepared by a variety of methods, usually requiring 2-benzylpyridine, synthesized from picolinic acid (2-pyridinecarboxylic acid) and an aldehyde. Picolinic acid is offered by Nepera, Synthetic Organics, Cleveland, and as the hydrochloride salt by Krishell Laboratories, Portland, Ore.

Alternate syntheses of benzylpyridine involve pyridine and benzyl chloride in the presence of copper, or 2-picoline with either an aldehyde or chloride. 2-Picoline is widely procurable from Barrett, Jones and Laughlin, Koppers, Pittsburgh Coke and Chemical, Reilly and others.

Benzylpyridine is converted to the potassium salt with potassium amide in liquid ammonia, and finally reacting this with β-dimethylaminoethyl chloride.

A totally different approach is through stepwise condensation of an arylacetonitrile, e.g., benzyl cyanide (Benzol Products and Trubek Laboratories, E. Rutherford, N.J.) with a dialkylaminoalkyl halide and 2-bromopyridine (Fairmount Chemical) in the presence of sodamide. The cyano group is subsequently removed from the intermediate trisubstituted nitrile by refluxing with sodamide in toluene.

This synthetic outline demonstrates the demand that arose for relatively new chemicals and the wider markets for older ones.

Smaller companies that have started the manufacture of intermediates find ready purchasers, and larger ones have stepped up production on their previously sparsely used compounds.

The success of pyridine, pyrimidine and thienyl derivatives has spurred research on use of heterocycles in other drug realms, such as antispasmodics, anaesthetics, etc. If increased production of these intermediates lowers the prices to a suitable level, many laboratories will initiate research, prohibitive now on a competitive basis, on their possible uses.

CLINICAL USE

Clinical trial must always remain the criterion of antihistamine effectiveness, for compounds with extremely high "lab activity" are not always superior therapeutically. Comparison of clinical effectiveness is complicated by lack of quantitative, objective methods of evaluation. Tabulated comparisons of various antihistaminics suffer from differences in criteria and the unreliable subjective reports of patients. Compiled data is probably accurate only within 15%—a margin of error greater than the usual observed differences among the various drugs.

However, certain drugs are of more benefit in some cases than others and side effects vary. In one case a drug may work in small doses and in another it may be ineffective in any amount. The reasons are not known. Differences are also found in the capacity to tolerate these drugs.

Antihistamines are not cures but only relieve the various allergic conditions. They must be continued in use when the allergic state returns.

Major respiratory allergies: Seasonal hay fever responds best to the antihistamines; about 80% of patients are relieved. Only about 50% of nonseasonal hay fever sufferers are improved. The chronic nature of the nonseasonal condition necessitates concern as to the safety of prolonged therapy. Bronchial asthma results have been very unpromising.

Skin conditions: Suitable doses of antihistamines afford relief to approximately 75% of hives afflictions. Antihistamines have not been as satisfactory in the treatment of eczema. The principal action of the drugs seems to be the ability to alleviate itching; scratching is minimized and secondary infections and skin lesions clear more rapidly.

New drugs are often tried in a wide variety of seemingly unrelated diseases. Migraine symptoms, for example, were found to be aided in a limited number of cases.

Treatment of eye diseases of known allergic origin has been quite satisfactory. Dramamine has proved valuable in the treatment of motion sickness. Benadryl has been used to control the symptoms in Parkinson's disease (progressive paralysis).

Severity of symptoms most influences the size of the dose. Size and age of the individual have a definite relation. The patient's activities and duties often dictate the dosage. For aviation pilots, airmen, bus drivers and those in other critical occupations, use of any amount of the antihistamines, while on duty, is questionable.

The average doses of antihistamine varies from 4 mg. for Chlortrimeton (Schering) to 100-200 mg. for Antistine (Ciba) and Neohetramine (Nepera). Most antihistamines have approximately a four hour duration of

effect, while the two mentioned ones may last for a period of eight to 12 hours with moderate doses.

DOSAGE FORMS

Oral administration of antihistamines is most common. The drugs are usually procurable in capsules, sugar-coated pills, plain compressed tablets or grooved tablets. Enteric coating has been used to produce delayed effects, and one manufacturer has combined the plain and enteric coated tablet by putting the immediately dissolved antihistamine on the outside and the enteric coated dose in the core of the pill.

Elixirs or syrups of most of the antihistamines, where the dose can be made more elastic, are obtainable for children. Intramuscular or intravenous injections are usually not used. It is usually indicated when a rapid effect is desired as in allergic emergencies. Suppositories for rectal administration are useful in local conditions or to take the place of oral administration when this is difficult.

Nose drops often afford relief in nasal allergy. Best results are usually obtained with a nebulizer having a nasal attachment. Aerosols of antihistamines are effective in preventing histamine asthma. Nasal inhalers are a new addition, offered chiefly for quick relief to hay fever sufferers.

Ointments and creams, using various bases, are quite helpful in itching conditions of the skin.

Fortunately, the antihistaminic compounds have proved to be relatively nontoxic in the usual doses, though they frequently give rise to bothersome side effects. Reported deaths have resulted chiefly from accidental overdosage. The most characteristic side action is sedative, varying from calm to sleepiness.

Danger of self-medication is not from ingestion of normal doses of the drugs, but rather from the lack of alertness which often follows.

COMMON COLD

Insurance companies estimate that the common cold costs the American people over a billion dollars a year.

Promotion of the antihistamines for the treatment of colds, after permission had been granted by the Federal Drug Administration, propelled antihistamines alongside aspirin, laxatives, chest rubs, alkalizers, etc., as an established giant of the proprietary drug industry. The past two winters have seen them consistently outsell the older established staples.

LARGE SALES JUMP since antihistamines have been sold without prescription heightened demand for chemical intermediates.

Considerable difference of opinion exists, backed by numerous pro and con arguments, as to the value of antihistamines in colds.

Whatever the merits or demerits, it has been established that the initial response of the body to the cold virus is the release of histamine with subsequent local effects. If antihistamine drugs are given at this early stage, the chances are good that the cold will be warded off.

The later stage is infectious, where destruction of the surface cells of the mucous membranes permits bacterial invasion. The antihistamines are useless here. In fact, physicians have learned to use antihistamines to differentiate allergy from infection.

The three compounds first certified for over-the-counter sale by the Food and Drug Administration were Neohetramine (Nepera), Neo-Antergan (Merck) and Trimeton (Schering). Neohetramine was cleared first in September 1949, and Anahist Co. (a subsidiary of Nepera) prepared for large-scale national advertising around December 1 to tie in with a laudatory article by Paul de Kruif in *The Reader's Digest*. They were beaten to the public's attention by Union Pharmaceutical Co. (proprietary subsidiary of Schering), which broke newspaper ads in New York and Washington plugging Inhiston (Trimeton). Huge advertising campaigns broke out. Shortly after Whitehall Pharmacal Co. brought out Kriptin; Bristol-Myers promoted Resistabs; Grove Laboratories advanced Antamine; and Miles Laboratories pushed Tabcin.

Sales rose to a peak in February 1950, with Anahist and Inhiston leading the field. Around mid-March they began to level off and fall. It was partly seasonal, but a more serious factor was the American Medical Association's and the Federal Trade Commission's blasts against advertising claims. The FTC brought complaints against Bristol-Myers, Anahist, Whitehall, Union and Grove, charging misrepresentation of therapeutic properties. In settlement, the companies agreed not to promote their products as capable of curing or stopping the common cold. They could continue to claim that the antihistamines would relieve, check or "in many cases" stop cold symptoms.

In the summer of 1950 Anahist started intense promotion of an atomizer which dispensed the drug in spray form. This represented an attempt to catch the summer hay fever

market and level off the sales peaks and valleys that always plague cold remedies. In August and September the atomizers returned a tidy $1.5 million at retail. Recently Anahist has put forth "Hist-O-Plus," which contains aspirin, phenacetin and caffeine in addition to the Thonzylamine. These other ingredients are old stand-bys of the famous "APC" combination designed to relieve the aches and pains that result from neglected colds. The experiment will be closely watched to see whether combinations with APC can overcome the comparatively high consumer cost barrier.

A somewhat surprising feature is that the large antihistamine gross has not affected the volume of the older cold proprietaries. They even rose 11% this past season.

ENGINEERING

Production of antihistamines has evoked no startling innovations in plant design or production technique. Drug manufacturers — who had wrestled with infinitely more complex questions in antibiotics, vitamins, hormones and sulfa drugs—applied their vast fund of know-how to lick the always arising problems. Those pharmaceutical houses engaged in the production of somewhat similar antispasmodics and anaesthetics possessed a valuable head start.

Where unusual toxicities exist, as in the cases of the aminohalides and especially the dichloroethylamines, necessary remote control operation and adequate venting is required, and was supplied after shaky starts. Use of sodamide, lithium amide, lithium aluminum hydride (used in carbonyl reductions) and liquid ammonia necessitate proper precautions, including inert gas atmospheres.

Glass lined tanks are imperative in certain cases where tests showed that stainless steel poisons a reaction.

Rapid procurement of filter presses, tanks, extractors, centrifuges, condensers, etc., is always difficult when sales suddenly demand greater production. Ingenuity in shifting equipment and building up stockpiles of key intermediates licked many a crisis until suppliers could deliver.

Progress in unit operations will undoubtedly lower engineering costs and concomitantly lower price of the finished product to the consumer.

FUTURE

What about the future? Tremendous sales attest to substantial public acceptance. To the person achieving a degree of relief from cold symptoms it is merely of academic interest whether the antihistamine cures the virus or the allergic type of cold.

Careful advertising and sales planning have weathered the attacks of organized medicine and the FTC, and advertising budgets remain high.

"Gadgetry" rather than new agents seem the present trend, with atomizers, creams, ointments, inhalers, expectorants, delayed-action tablets and other variations constantly appearing. Formulations utilizing amphetamine, desoxyephedrine, aminophylline, barbitals, codeine, etc., have appeared for use in sundry ailments where allergy is suspected.

The ideal antihistamine has not yet been found. Such a drug should have a favorable therapeutic index; i.e., it should have high potency and small toxicity. This dose should be many times the average with a prolonged action.

Prevention of the production of histamine (antihistaminogenesis) with the flavonoids has been investigated, but results with catechin were not promising. Recent striking effectiveness with ACTH and cortisone may be due to an alteration in the tissue which makes the animal less susceptible to histamine effects. This possible modification of tissue reactivity leads to a new approach in the study of allergy.

The antihistamines have been called a passing fancy by many. It's more likely that they will be a prolonged fancy for many years.

REFERENCES

1. Bobet, D., and Bovet-Nitti, F.: *Medicaments Du Systeme Nerveux Vegetatif*, chapter 22; S. Karger, Basel (1948).
2. Editorial: *J. Am. Med. Assoc. 142*, 566 (1950).
3. Feinberg, S. M., Malkiel, S., and Feinberg, A. R.: *The Antihistamines;* Year Book Publishers, Chicago (1950).
4. Huttrer, C. P., and Leonard, F.: *Histamine Antagonists;* National Research Council (1950).
5. Idson, B.: *Chem. Revs. 47*, 307 (1950).
6. Loew, E. R.: *Physiol. Revs. 27*, 542 (1947).
7. Wishnefsky, N.: *Antihistamines;* Industry and Product Survey; Chemononomics, Inc., New York (1950).

ANTIHISTAMINE PREPARATIONS

Antihistamine (Manufacturer's Name)	Chemical Name	Distributor's Trade Name	Compounded and Distributed by	Dispensed as	Ingredients
Anthallan	3'-di(n-butyl) aminoethyl-4,5,6-trihydroxybenzo- (1,2) furan-1'(3')-one	Anthallan	Medico Chemical Corp. of America	Tablet	85 mg.
		Antaphylline	Medico Chemical Corp of America	Tablet	85 mg. + 100 mg. Aminophyllin
Antistine hydrochloride (Antazoline, Phenazoline HCl	2-(N-Benzyl-N-phenylaminomethyl-imidazoline hydrochloride	Antistine	Ciba	Tablet	100 mg.
		Antistine Nasal Solution	Ciba	Liquid	0.5%, pH 6.2
		Antistine Ophthalmic Solution	Ciba	Liquid	0.5% in isotonic solution, pH 6.94
		Antistine-Privine Solution	Ciba	Nasal Drops	0.5% 0.025% of privine (Naphazoline hydrochloride) with phenyl mercuric nitrate as preservative.
		Antistinetten	Ciba (Basel)	Tablet	25 mg.
Benadryl (Diphenhydramin hydrochloride)	B-dimethylaminoethyl benzhydryl ether hydrochloride	Benadryl	Parke, Davis	Capsule	25 mg.
		Kapseals Benadryl	Parke, Davis	Capsule	50 mg.
		Benadryl Emplets	Parke, Davis	Enteric-coated tablet	50 mg.
		Steri-vial Benadryl	Parke, Davis	Injectable	10 mg. per ml.
		Elixir Benadryl	Parke, Davis	Liquid	10 mg. per 4 ml. 14% alcohol
		Benadryl Cream	Parke, Davis	Ointment	2% in a water miscible ointment base
		Benylin Expectorant	Parke, Davis	Liquid	Each fluid ounce contains 80 mg., 12 grains ammonium chloride, 5 gr. sodium citrate, 2 gr. chloroform and 1/10 gr. menthol, and 5% alcohol.
		Benadryl with Ephedrine capsules	Parke, Davis	Tablet	50 mg., Ephedrine sulfate 10 mg.
		Caldryl	Parke, Davis	Lotion	1% in Calamine, camphor and glycerine

Antihistamine (Manufacturer's Name)	Chemical Name	Distributor's Trade Name	Compounded and Distributed by	Dispensed as	Ingredients
Benadryl (cont'd)		Benodine	N. V. Koninklijke Pharmaceutische Fabricken, Amsterdam.	Ointment	2%
		Colmin	Canada Pharmacal Co. Ltd.	Tablet	20 mg., 0.23 gm. acetylsalicylic acid, 0.15 gm. acetophenetidin, 1 mg. desoxyephedrine hydrochloride.
		Desentol	Leo Aktiebolaget (Halsingborg)		
		Hydryllin	G. D. Searle	Tablet	25 mg. plus 100 mg. aminophylline.
		Hydryllin with Racephedrine	G. D. Searle	Tablet	25 mg., 100 mg. aminophylline, 25 mg. racephedrine hydrochloride.
		Hydryllin Compound	G. D. Searle	Liquid	Each 4 ml. contains 6.25 mg. diphenhydramine, 25 mg. aminophylline, 15 mg. potassium iodide, 8 mg. chloroform, 2.8 mg. sugar, 2.5% alcohol.
		Hydryllin Elixir	G. D. Searle	Liquid	Each 4 ml. contains 12.5 mg., 50 mg. aminophylline, 19% alcohol.
		Amidryl	A/S Medicinalco (Copenhagen)	Tablet	50 mg.
Chlorcyclizine hydrochloride	N-Methyl-N'-(4-chlorobenzhydryl) piperazine hydrochloride	Di-Paralene	Abbott	Tablet	25 and 50 mg.
		Histantin	Burroughs Wellcome (London)	Tablet	50 mg.
		Perazil	Burroughs Wellcome	Tablet	50 mg.
		Thenylene-Di-Paralene	Abbott		Methapyriline and chlorcyclizine
Chlorothen citrate (Chlorothenyl-pyramine citrate)	N'-Pyridyl-N'-5-chlorothenyl-N, N-dimethylethyl-enediamine citrate	Tagathen	Lederle	Tablet	25 mg.
		Chlorothan	Whittier	Tablet	25 mg.
		Caubren Compound	Whittier	Tablet	25 mg., 320 mg. acetophenetidin, 32 mg. caffeine
		Fernoxydyne Compound	George A. Breon	Tablet	25 mg., 320 mg. acetophenetidin, 32 mg. caffeine.
		Pyrithen	Charles E. Frosst (Montreal)	Tablet	25 mg.
		Pyrithen Compound	Charles E. Frosst (Montreal)	Tablet	25 mg., 150 mg. acetophenetidin, 200 mg. acetylsalicylic acid, 30 mg. caffeine.
Chlor-Trimeton (Chlorprophen-pyridamine maleate)	1-p-chlorophenyl-1-(2-pyridyl)-3-dimethylamino-propane	Chlor-Trimeton maleate	Schering	Tablet	4 mg.
		Chlor-Trimeton maleate syrup and elixir	Schering	Tablet	Each 4 cc contains 2 mg.
		Coricidin	Schering	Tablet	2 mg. plus 3½ gr. aspirin plus 2½ gr. acetophenetidin plus ½ gr. caffeine.
		Chlor-Trimeton Repeat action	Schering	Tablet	8 mg.—Two layers, 4 mg. on outside and 4 mg. in special inner coating
Decapryn (Doxylamine succinate)	B-dimethyl-aminoethoxy-methylbenzyl-pyridine	Decapryh Succinate	Wm. S. Merrell	Tablet	12.5 and 25 mg.
		Decapryn Succinate	Wm. S. Merrell	Liquid	5 ml. = 6.25 mg.
		Decapryn with APC	Wm. S. Merrell	Tablet	6 mg. plus 230 mg. aspirin plus 150 mg. acetophenetidin plus 30 mg. caffeine.
		Decapryn Minergic Solution	Wm. S. Merrell	Injectable	5 mg./ml. plus penicillin 100,000 units.
		Mercodol with Decapryn	Wm. S. Merrell	Liquid	30 ml. =36 mg. plus 10 mg. dihydrocodeinone bitartrate plus 100 mg. methylethylamino-phenyl-propanol hydrochloride (Nethamine) plus 1.2 gm. sodium citrate.
		Nethaprin Syrup	Wm. S. Merrell	Liquid and capsule	5 ml. =6 mg. plus 25 mg. Nethamine plus 60 mg. theophylline aminoisobutanol
		Decapryn Compound Syrup	Wm. S. Merrell	Liquid	5 ml. =6 mg. plus sodium salicylate 0.3 gm. plus caffeine 15 mg.
		Decapryn Succinate Syrup	Wm. S. Merrell	Liquid	4 ml. =25 mg.
Diatrin (Methophenilene hydrochloride)	N,N-dimethyl-N'-phenyl-N'-(2-thienyl-methyl)-ethylenediamine hydrochloride	Diatrin Hydrochloride	Wm. R. Warner	Tablet	50 mg.
Dramamine (Dimenhydrinate)	B-dimethylamino-ethyl benzhydryl ether 8-chlorotheophyllinate	Dramamine	G. D. Searle	Tablet	50 mg. and 100 mg.
		Dramamine	G. D. Searle	Liquid	4 ml. contains 12.5 mg., 5% alcohol
Foralamin (Methafurylene fumarate)	N'-(2-furylmethyl)-N'-(2-pyridyl)-N,N-dimethyl-ethylenediamine	Foralamin	Eaton Laboratories	Tablet	50 mg.
Histadyl (Thenyl-pyramine hydrochloride) (Methapyrilene hydrochloride)	N'-(2-pyridyl)-N'-(2-thenyl)-N,N-dimethylethylene-diamine	Themylene	Abbott	Tablet	25, 50 and 100 mg.
		Thenylfred	Abbott	Tablet	50 mg. plus 25 mg. ephedrine hydrochloride
		Thenylene and Desoxyn	Abbott	Tablet	50 mg. plus 25 mg. desoxyephedrine hydrochloride
		Thenylene cream	Abbott	Ointment	2% in water soluble base
		Tenasfen	Abbott (Export)	Tablet	25 mg. plus 150 mg. acetophenetidin plus 230 mg. aspirin plus 30 mg. caffeine
		Thenylene APC	Abbott	Capsule	25 mg. plus 230 mg. aspirin plus 150 mg. acetophenetidin plus 30 mg. caffeine

Antihistamine (Manufacturer's Name)	Chemical Name	Distributor's Trade Name	Compounded and Distributed by	Dispensed as	Ingredients
Histadye (cont'd)		Thenylene-Di-Paralene	Abbott	Tablet	Chlorcyclyzine plus methapyrilene
		Tabcin	Miles Laboratories	Tablet	30 mg. plus 200 mg. acetophenetidin plus 30 mg. caffeine
		Methapyrilene hydrochloride	Blue Line Chemical	Tablet	50 mg.
		Pentryl	Chilcott (Maltine Co.)	Tablet	50 mg. plus 16 mg. ephedrine hydrochloride plus 16 mg. sodium pentobarbital.
		Pentryl	Chilcott	Enteric Coated Tablet	Same as for uncoated tablet
		Histafed	Cole Chemical	Capsule	25 mg. plus 8 mg. ephedrine hydrochloride plus 10 mg. ascorbic acid.
		Pulvules Histadyl	Eli Lilly	Capsule	25, 50 and 100 mg.
		Histadyl Ampoule	Eli Lilly	Injectable	20 mg./ml.
		Histadyl Syrup	Eli Lilly	Liquid	5 cc = 30 mg. methapyridine fumarate
		Cream Histadyl	Eli Lilly	Ointment	2%
		Cream Histadyl-Surfacaine	Eli Lilly	Ointment	2% plus 0.5% surfacaine (cyclomethycaine)
		Enseals Histadyl	Eli Lilly	Enteric-Tablet	50 mg.
		Histadyl	Eli Lilly	Ophthalmic ointment	0.5%
		Pulvules Histadyl-ASA Compound	Eli Lilly	Tablet	25 mg. plus 3½ gr. aspirin plus 2½ gr. acetophenetidin plus ½ gr. caffeine
		Pulvules Histadyl-Ephedrine hydrochloride No. 1 and No. 2	Eli Lilly	Tablet	25 mg. plus 8 mg. ephedrine hydrochloride; 50 mg. plus 16 mg. ephedrine HCl
		Solution Histadyl	Eli Lilly	Nasal and Ophthalmic solution	0.5% with phenylmercuric nitrate, 1:50,000 as a preservative in normal, saline solution
		Histadyl E. C. Syrup	Eli Lilly	Nasal and Ophthalmic Solution	100 cc = 270 mg. Methapyrilene fumarate plus 200 mg. codeine phosphate plus 100 mg. ephedrine hydrochloride plus 2.2 gm. ammonium chloride plus 0.4 cc chloroform-menthol.
		Histadyl	Eli Lilly	Liquid	4 mg./ml.
		Histadyl Compound-Ephedrine and Codeine	Eli Lilly	Liquid	1 oz. = 30 mg. plus 1 gr. codeine plus ½ gr. ephedrine
		Histadyl-surfacaine	Eli Lilly	Lotion	2% plus 0.5% surfacaine (cyclomethycaine)
		Hista-clopane Pulvules	Eli Lilly	Capsules	25 mg. plus 12.5 mg. cyclopentamine
		Coryzol	Desbergers Ltd. (Montreal)	Tablet	(Note: Quantities not listed) Ephedrine, acetophenetidin, aspirin, caffeine.
		Pyrathyn	Flint, Eaton	Capsule	50 mg.
		Capathyn	Flint, Eaton	Tablet	20 mg. plus 230 mg. aspirin plus 150 mg. acetophenetidin plus 30 mg. caffeine.
		Pyracol	Flint, Eaton	Liquid	1 oz. = 160 mg. plus 778 mg. ammonium chloride plus 648 mg. citric acid plus 130 mg. chloroform plus 6 mg. menthol.
		Methoxylene	McNeil	Tablet	50 mg. plus 25 mg. racemic desoxyephedrine hydrochloride.
		Corenil	Flint, Eaton	Tablet	25 mg. plus 7.5 mg. extract belladonna plus 1.25 mg. racemic desoxyephedrine hydrochloride
		Hisdrin	S. E. Massengill	Tablet	50 mg. plus 2.5 mg. d-desoxyephedrine hydrochloride
		Semikon	S. E. Massengill	Tablet	50 mg.
		Semikon	S. E. Massengill	Enteric-coated tablet	50 and 100 mg.
		Dasikon	S. E. Massengill	Capsule	25 mg. plus 30 mg. caffeine plus 200 mg. aspirin plus 120 mg. acetophenetidin plus 0.06 mg. atropine sulphate.
		Sedacof Expectorant	S. E. Massengill	Liquid	5 ml. = 15 mg. plus 200 mg. sodium citrate plus 100 mg. ammonium chloride plus 10 mg. ephedrine HCl plus 1 mg. antimony potassium tartrate.
		Semikon cream	S. E. Massengill	Ointment	2% in a water soluble base.
		Cohistine	Pitman-Moore	Tablet	25 mg. plus 225 mg. aspirin plus 160 mg. acetophenetidin plus 1 mg. dextro amphetamine sulfate.
		Pyrahistine (for animals)	Pitman-Moore	Solution	
		Neovacagen	Sharp and Dohme		25 mg. with the soluble antigen substances obtained from approximately 100,000 million bacteria usually associated with infection of the respiratory tract.
		Proketal compound	Sharp and Dohme	Capsule	25 mg. plus 230 mg. aspirin plus 150 mg. acetophenetidin plus 30 mg. caffeine.
		Proketal compound with codeine	Sharp and Dohme	Capsule	25 mg. plus 230 mg. aspirin plus 150 mg. acetophenetidin plus 30 mg. caffeine plus 15 mg. codeine phosphate.
		Proketuss	Sharp and Dohme	Syrup	Each 5 cc. contains 10 mg. plus 15 mg. phenylpropanolamine hydrochloride plus 150 mg. potassium citrate plus 15 mg. chloroform plus 1 mg. menthol plus 5% alcohol.
		Nuclon	Smith, Kline and French	Capsule	37.5 mg. thenylpyramine fumarate (=25 mg. hydrochloride) plus 1.25 mg. dextroamphetamine sulfate plus 2.5 gr. aspirin.
Neo-Antergan (Pyrilamine, Pyranisamine, Mepyramine, Anthisan)	N'-p-methoxybenzyl-N'-2-pyridyl)-N-dimethylethylene-diamine	Paraminyl Maleate	Buffington's	Tablet	50 mg.
		Dolopar	Buffington's	Tablet	32 mg. plus 225 mg. aspirin plus 162 mg. acetophenetidin plus 15 mg. caffeine plus 1 minim tincture gelsemium.
		Afko-Hist	American Pharmaceutical Co.	Tablet	25 mg.

Antihistamine (Manufacturer's Name)	Chemical Name	Distributor's Trade Name	Compounded and Distributed by	Dispensed as	Ingredients
Neo-Antergan (cont'd)		Allersan	Teva, Ltd. (Jerusalem)		
		Anefrine	Valentine Lab.		
		Antamine	Grove Laboratories	Tablet	25 mg.
		Anthisan	May & Baker Ltd. (England)		
		Anthisan Cream	May & Baker Ltd. (England)		
		Anti-Histamine	Armour Laboratories	Tablet	25 mg.
		Pyranisamine Maleate	Otis Clapp	Tablet	25 mg.
		Pyramal	Columbus	Tablet	25 mg.
		Pyrasal	Columbus	Tablet	25 mg. plus 325 mg. aspirin plus 16 mg. caffeine.
		Pyranisamine Maleate	Direct sales	Tablet	25 and 50 mg.
		Neo-Antergan	Merck	Tablet	25 and 50 mg.
		Pyranisamine Maleate	Premo	Tablet	25 and 50 mg.
		Neo Cafotan	Premo	Tablet	¼ gr. plus ½ gr. caffeine plus 2½ gr. acetophenetidin plus 3½ gr. aspirin.
		Neomine	Professional Drug Service	Tablet	25 mg.
		Acetomine		Tablet	25 mg. plus 3½ gr. aspirin plus 2½ gr. acetophenetidin plus ½ gr. caffeine.
		Pyranisamine Maleate	Rexall	Tablet	25 and 50 mg.
		Monohiston with APC	Rexall	Tablet	25 mg. plus 2½ gr. acetophenetidin plus 3½ gr. aspirin plus ½ gr. caffeine.
		Thylogen	Wm. H. Rorer	Tablet	25 and 50 mg.
		Pyranisamine Maleate	Smith-Dorsey	Tablet	50 mg.
		PPA Capsule	Smith-Dorsey	Capsule	25 mg. plus 1 gr. acetophenetidin plus 5 gr. aspirin.
		Pye Capsule	Smith-Dorsey	Capsule	50 mg. plus 10 mg. ephedrine sulfate.
		Antopic Cream	Smith-Dorsey	Ointment	5% plus calamine plus zinc oxide plus benzocaine
		Renstamine	R. J. Strasenburgh	Tablet	25 mg. plus 2.5 mg. amphetamine phosphate
		Renstamine	R. J. Strasenburgh	Liquid	5 ml. =10 mg. plus 1 mg. amphetamine phosphate.
		Pyra-Maleate	Van Pelt and Brown	Tablet	25 and 50 mg.
		Dexa-pyramine	Van Pelt and Brown	Capsule	25 mg. plus 2 mg. dextro amphetamine HCl plus 2½ gr. aspirin plus ¼ gr. caffeine plus 2½ gr. acetophenetidin.
		Dexa-pyramine	Van Pelt and Brown	Injectable	Each ml. =25 mg. plus 2 mg. dextro amphetamine HCl plus 0.3% phenol plus distilled water qs.
		Histacin	Walker Vitamin	Capsule	20 mg. plus 180 mg. aspirin plus 120 mg. acetophenetidin plus 60 mg. caffeine plus 30 mg. ascorbic acid.
		Asphamal	Central Pharmacal Co.	Tablet	12.5 mg. plus 0.32 g. acetophenetidin plus 10.8 mg. racephedrine HCl.
		Boyle A-H	Boyle and Co.	Tablet	25 mg.
		Histacaps	Vick Chemical	Tablet	25 mg.
		Copsamine	S. F. Durst and Co.	Tablet	25 mg.
		Coradon	Person and Covey	Tablet	25 mg.
		Histacol	Histacol Corp.	Tablet	25 mg.
		Histaids	Vick Chemical	Tablet	25 mg.
		Histalon	Hance Bros. and White	Tablet	25 mg.
		Histan	Sherman Laboratories	Tablet	25 mg.
		Histavac	Sherman Laboratories	Tablet	Contains two types of tablets: "Histan," 25 mg.; "Shervac," vaccine prepared from bacteria usually associated with respiratory tract infections.
		Histapacq	Horton and Converse	Tablet	25 mg. plus 2 gr. acetophenetidin plus 3 gr. acetylsalicylic acid plus 0.5 gr. caffeine plus 0.5 gr. quinine sulfate.
		Histapyran	Horton and Converse	Tablet	25 mg.
		Histasan	Park Drug	Tablet	25 mg.
		Historal	Supreme Pharmaceutical Co.	Tablet	25 mg.
		Histavite	Vitarine	Tablet	25 mg.
		Kriptin	Whitehall Pharmacal	Tablet	25 mg.
		Super hist	Pharmacal	Tablet	10 mg.
		Macy's Antihistamine	R. H. Macy & Co.	Tablet	25 mg.
		Marranhist	Marlo Products Co.	Tablet	25 mg.
		Minihist	Ives-Cameron Co.	Tablet	25 mg.
		O.N.P.	Clark & Clark	Tablet	25 mg. plus 5 gr. aspirin plus 3 mg. amphetamine phosphate plus 3 gr. dihydroxy aluminum aminoacetate.
		Onteen	Vitamin-Quota	Tablet	25 mg.
		Orastin	Commerce Drug Co.	Tablet	25 mg.
		Pinex Antihistamine	Pinex Co.	Tablet	25 mg.
		Previcel	Previcol Division, Rand Pharmacal Co.	Tablet	10 mg. plus 2½ gr. acetophenetidin plus 3½ gr. aspirin plus ½ gr. caffeine.
		Pymafed	Lloyd Brothers Pharmacists	Tablet	50 mg. plus 18 mg. ephedrine sulfate plus 1 mg. atropine methyl nitrate
		St. Joseph Antihistamine	Plough	Tablet	25 mg.
		Reragin	S. F. Durst and Co.	Tablet	25 mg. plus 2.5 gr. acetophenetidin plus 3.5 gr. aspirin plus 0.5 gr. caffeine.
		Waits Green Mountain Antihistamine	Wait-Cahill Co.	Tablet	25 mg.
		Histar	Tarbonis	Ointment	2% plus 5% coal-tar extract in water miscible base.
Pyranisamine 8-bromo- theophyllinate (Pyrabrom)	8-theophylline salt of Neo-Antergan	Glybrom	E. L. Patch	Tablet	50 mg.
Neo-Benodine	b-dimethylamino-ethyl-4-methyl-benzhydryl ether hydrochloride	Neo-benodine	N. V. Koninklijke Pharmaceutische Fabrieken, (Amsterdam)	Tablet	20 mg.

Antihistamine (Manufacturer's Name)	Chemical Name	Distributor's Trade Name	Compounded and Distributed by	Dispensed as	Ingredients
Neohetramine (Thonzylamine Hydrochloride)	N,N-dimethyl-N'-(2-pyrimidyl)-N'-(p-methoxy-benzyl)-ethylenediamine	Neohetramine	Wyeth	Tablet	25, 50 and 100 mg.
		Neohetramine	Wyeth	Liquid	6.25 mg./ml.
		Neohetramine Cream	Wyeth	Ointment	2%
		Anahist	Anahist Co.	Tablet	25 mg.
		Anahist	Anahist Co. (Canada)	Tablet	25 mg.
		Anahist in atomizer	Anahist Co. (Canada)	Atomizer	1% plus 0.4% menthol plus 0.0065% methylparaben plus 0.0035% propyl paraben
		Hist-O-Plus	Anahist Co.	Tablet	Antihist plus APC.
		Resistab	Bristol-Myers	Tablet	25 mg.
Phenergan (Promethiazine Hydrochloride)	N-dimethylamino-2-propyl-1-phenothiazine	Panaldamin	National Drug	Tablet	2 mg. plus 0.22 gm. aspirin plus 0.15 gm. acetophenetidin plus 0.03 gm. caffeine.
		Phenergan	Laboratories Poulen Freres du Canada (Montreal)		
		Vallergine	May & Baker Ltd., (England)		
Pyribenzamine (Tripelennamine Hydrochloride)	N,N-dimethyl-N'-benzyl-N'-2-pyridyl-ethylenediamine	Pyribenzamine	Ciba	Tablet	50 mg.
		Pyribenzamine delayed action	Ciba	Enteric coated tablet	50 mg.
		Pyribenzamine Elixir	Ciba	Liquid	7.5 mg. (citrate) per ml.
		Pyribenzamine Ointment	Ciba	Ointment	2% (petrolatum base)
		Pyribenzamine Cream	Ciba	Ointment	2% (water miscible base)
		Pyribenzamine-Ephedrine	Ciba	Tablet	25 mg. plus 12 mg. ephedrine sulfate
		Pyribenzamine Expectorant with Ephedrine	Ciba	Liquid	Each 4 ml. = 30 mg. (citrate) plus 10 mg. ephedrine sulfate plus 80 mg. ammonium chloride.
		Pyribenzamine	Ciba	Nasal Solution	0.5% in isotonic buffered solution
		Pyribenzamine	Ciba	Injectable	25 mg./ml.
		Pyribenzamine	Ciba	Nebulizer	0.5%
Pyrrolazote (Pyrathiazine)	10-(B-pyrrolidinoethyl)-phenothiazine	Pyrrolazote Abergic	Upjohn	Tablet	25 and 50 mg.
		Pyrrolazote Elixir	Upjohn	Liquid	Each ml. = 2.5 mg. (citrate) plus 10% alcohol plus balsam tolu, glycerin and aromatics.
		Pyrrolazote delayed action	Upjohn	Laminated tablet	50 mg. (enteric coated 25 mg. core)
		Pyrroxate	Upjohn	Capsule	12.5 mg. plus 25 mg. orthoxine (methoxyphenamine hydrochloride) plus 162 mg. acetophenetidin plus 228 mg. aspirin plus 37 mg. caffeine.
Synthenate Tartrate	p-methyl-aminoethanol tartrate	Synthenate	Breon	Injectable	1 cc = 100 mg.
Synopen	N',N'-dimethyl-aminoethyl-N-p-chlorobenzyl-N-(2-pyridine) hydrochloride	Synopen	Geigy A. G. (Basle)	Sugar coated Tablet	25 mg.
Tagathan (see Chlorothan)					
Thenfadil	N,N-dimethyl-N'-(2-pyridyl)-N'-(3-thenyl)-ethylenediamine	Neo-synephrine-thenfadil	Winthrop-Stearns	Nasal Solution	0.1% plus 0.25% Neo-synephrin in buffered isotonic aqueous solution
		Thenfadil	Winthrop-Stearns	Tablet	15 mg.
		Thenfadil compound	Winthrop-Stearns	Tablet	6 mg. plus 2 gr. acetophenetidin plus 3 gr. aspirin plus ¾ gr. caffeine.
Thenylene (see Histadyl)					
Thephorin (Phenindamine Tartrate)	2-methyl-9-phenyl-2,3,4,9-tetra-hydro-1-pyridindene	Thephorin	Hoffmann-La Roche	Tablet	25 mg.
		Thephorin	Hoffmann-La Roche	Syrup	10 mg. per 4 ml.
		Thephorin	Hoffmann-La Roche	Ointment	5% in a carbo-wax base
		Thephorin	Hoffmann-La Roche	Lotion	5% in scented emollient base
		Thephorin-AC	Hoffmann-La Roche	Tablet	10 mg. plus 160 mg. aspirin plus 160 mg. acetophenetidin plus 15 mg. caffeine.
		Thephorin Expectorant	Hoffmann-La Roche	Liquid	4 ml. = 10 mg. plus 4 mg. codeine phosphate plus 4 mg. papaverine hydrochloride plus 50 mg. ammonium chloride plus 0.016 ml. chloroform.
		Thephorin	Hoffmann-La Roche	Injectable	12.5 mg./ml.
Trimeton (Prophenpyridamine maleate)	1-phenyl-1-(2-pyridyl)-3-dimethyl-aminopropane	Cehistra	Organon	Effervescent Tablet	10 mg. (maleate) plus 100 mg. ascorbic acid plus 320 mg. aspirin plus 1,820 mg. sodium bicarbonate, calcium hydroxide, citric acid.
		Trimeton	Schering	Tablet	25 mg.
		Trimeton Maleate Elixir	Schering	Liquid	4 ml. = 7.5 mg., 7% alcohol
		Trimeton Maleate Cream	Schering	Ointment	3% in a non-oleaginous base
		Trimeton Maleate with prepared neocalamine	Schering	Lotion	2% plus neocalamine NF plus zinc oxide
		Inhiston	Union Pharmaceutical	Tablet	10 mg.
Trimeton p-Amino Salicylate		Avil	Farbwerke Hoechst (Germany)	Tablet	50 mg.
		Avil	Farbwerke Hoechst (Germany)	Injectable	2 cc. = 50 mg.

WHAT'S NEW . . . . . .

More Xylenes Loom

More and more xylenes will be available as by-products of petroleum benzene.

Ortho xylene is already being separated, used as raw material for phthalic anhydride.

Fast-developing uses for meta and para will make their separation economically sound.

DACRON CURTAINS: A good outlook for para xylene.

Almost overlooked in the rush to make more benzene from petroleum is the buried fact that a comparable amount of xylenes is made in the same process.

This lack of attention is nothing new for the xylenes, but a reversal of this attitude by the chemical industry is overdue. Expanded production and development of new uses are two factors that will perk up interest.

Large quantities, to be sure, were used during World War II for aviation gasoline and lacquer solvents, but these are non-chemical and non-premium uses. Only within the last four or five years have their potentialities been recognized for chemical manufacture.

First major step in this direction was the commercial oxidation of ortho xylene to phthalic anhydride by Oronite Chemical on the West Coast in 1946. Removal of ortho from the other isomers, meta and para, is further justified by enhancing the latter two's value as aviation gasoline blending stock.

Almost simultaneously with the new phthalic process came the introduction of Terylene fiber in England, based on ethylene glycol and terephthalic acid, the latter derived from para xylene.

Within the last few months, Du Pont has begun construction on a new plant in North Carolina to make its version of the same product, formerly called Fibre V.* Present plans call for around 50 million pounds a year, but every indication points to a demand that will eventually approach the 200-million-pound nylon production. Development of meta xylene uses has lagged behind these conspicuous early successes, but some optimistic reports about meta-derived isophthalic acid presages a new upturn.

Production is skyrocketing: Before World War II, production of petroleum xylenes was negligible. Practically all supplies came from distillation of coal tar light-oil, the quantity remaining almost constant at approximately 8 million gallons annually until the present time.

Advent of hostilities brought a tremendous need of toluene for TNT, and other aromatics for aviation gasoline, at the same time catapulting petroleum xylenes into the picture. Hydroformers converted naphthenic hydrocarbons in the C_6-C_8 range into benzene, toluene, xylenes, and ethylbenzene. Benzene was used mostly for aviation gasoline or for making cumene, since coal tar benzene in those days could take care of such chemical needs as styrene or phenol. Xylenes found considerable use for aviation gasoline, after removal of the ortho isomer, and xylidine additives were employed rather extensively in gasoline rich-rating improvement.

Plants now being authorized for construction to meet new mobilization requirements for benzene, use a modified hydroformer with a platinum catalyst. Both Universal Oil Products (Platforming) and Atlantic Refining have developed catalysts of this type possessing advantages in higher throughput, better yields of aromatics, and longer catalyst life.

By the end of 1952, around 100 million gallons of benzene will be produced by this means, with at least an equal amount of xylenes being made concurrently. By the time new production is in full swing, total xyene output will be hitting the 160-million gallon mark—a sizable amount to play with in any league.

Oxidation best bet: Most of the industrial chemical applications of xylene chemistry have relied on oxidation. Phthalic anhydride from ortho and terephthalic acid from para are both oxidation processes; best prospect for the meta isomer, isophthalic acid, is also an oxidation product.

But the xylenes, because of their reactivity, lend themselves to many other types of reactions: sulfonation, chlorination, and alkylation, to name only a few. These processes provide the basis for making xylenols for phenolic plastics, polyhydroxy compounds, chlorinated derivatives, and modified styrene plastics.

Separation is necessary: Separation of xylene isomers is a necessary preliminary to maximum utilization, either for chemical use or in aviation fuel blending stocks. Ordinarily, the mixed

* Renamed Amilar last month, will now be called Dacron.

HOOKER CHEMICALS
help you make
PHARMACEUTICALS

Aluminum Chloride, Anhyd.
Antimony Trichloride, Anhyd.
Benzoic Acid
Benzoyl Chloride
Benzyl Chloride
Monochloroacetic Acid
Muriatic Acid
Paranitrobenzoyl Chloride
Propionyl Chloride
Sodium Benzoate
Sodium Sulfhydrate
Sodium Sulfide
Sulfuryl Chloride
Thionyl Chloride

The Hooker Chemicals listed at the left are widely used in the manufacture of pharmaceuticals. As chemical intermediates they are in demand for other uses as well.

Increased demand occasionally makes it impossible to accept new business but we are doing everything possible to keep up with your needs. There has been and will be no compromise with Hooker quality and shipment-to-shipment uniformity.

As materials become available, they are shipped out promptly. Careful scheduling, and point-to-point checking en route, assure that Hooker Chemicals reach you in the same good condition as when they leave us.

IF YOU ARE INTERESTED in the typical properties, specifications and uses of any of these chemicals, we shall be glad to send you technical data sheets. For a complete list of Hooker Chemicals ask for Bulletin 100. Please request on your business letterhead.

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

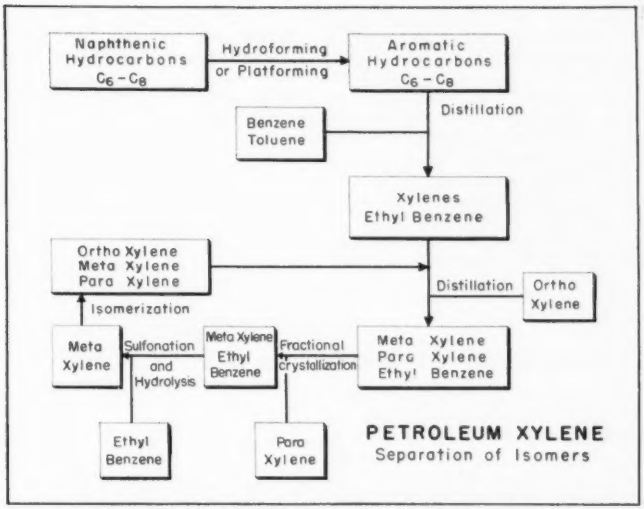
3 FORTY-SEVENTH ST., NIAGARA, FALLS, N. Y.

New York, New York • Wilmington, California • Tacoma, Washington

HOOKER CHEMICALS

1-185

CYCLOHEXANOL • PIPERIDINE • METHYL CYCLOHEXANOL • CUSTOM HYDROGENATIONS • CAUSTIC SODA • MURIATIC ACID • CHLORINE



SEPARATION OF ISOMERS: United they fall, divided they stand.

xylene fraction from petroleum hydroforming or coal tar distillation is 21% ortho, 50% meta, 19% para, and 10% ethylbenzene.

Close fractionation permits the separation of ortho from the other isomers, with a boiling point difference of only 5 C. The remaining isomers and ethylbenzene are suitable for aviation gasoline blending purposes, but the specific demand for para xylene makes its separation economically attractive.

Fractional crystallization has been the most effective method of separating para, but recovery is not complete and the process requires refrigeration, a relatively expensive physical operation.

Meta xylene is separable from ethylbenzene by selective sulfonation and hydrolysis.

The entire process has considerable flexibility because the meta isomer can be isomerized to additional ortho and para for recycle, utilized directly, or chemically converted to other products such as isophthalic acid. Ethylbenzene, concentrated in this process, has not been rendered suitable for styrene manufacture although other applications are available.

Many factors to weigh: Xylene economics is basically: to separate or not to separate; i.e., whether the increased value after separation will justify the processing cost. For the case of ortho removal from the other isomers, the separation is justified by the enhanced value for both ortho and for the meta-para mixture, and the low cost of distillation.

Separation of para xylene is also economically justified, despite the higher cost of fractional crystallization, because of the high premium value of the isomer for terephthalic. The price of 95% para is between 25-30¢ a pound, depending on the scale of production. Du Pont is buying para from Oronite and from Standard of New Jersey on a basis that is probably somewhat less than 25¢. The processing cost for the fractional crystallization step is between 1-2¢ a pound, and the meta-para mixture is valued around 6.5¢, so the para separation is an economically attractive proposition.

Further utilization of the meta isomer can be readily decided upon by evaluating the alternatives of isomerization, chemical conversion to products like isophthalic acid, and its value in gasoline blends. If relatively pure meta is required, cost of separation from ethylbenzene (by sulfonation and hydrolysis—about 1½¢ a pound) and ethylbenzene value must also be weighed.

Growth prospects good: The most characteristic feature of xylenes for industrial application is their tremendous potentiality for further growth. Some of the large-scale uses have only been developed in the brief period since World War II: phthalic anhydride from ortho xylene is now considered competitive with the naphthalene process, and polyglycol terephthalate fibers are moving rapidly. Reports from the industry of isophthalate plasticizers foretell chemical utilization of meta xylene on a large scale.

If this deveolpment materializes, a potential competition may develop between some uses of phthalic and isophthalic, although expansion will deemphasize this possibility for some time. Process flexibility in isomer conversion will be a real blessing in meeting shifting demand.

Under present conditions of mobilization, demand for aviation gasoline and shortages will tend to retard chemical development of meta xylene, in particular, and keep many promising new derivatives under wraps. But the combination of availability, low cost, and product diversification spells big-time for the three xylenes in years to come.

Coat for A

Newest synthetic vitamin development is commercial-scale production of crystalline vitamin A. For the first time, the substance will be generally available in a dry form permitting its inclusion in tablets and dry foods. Chas. Pfizer & Co. is geared to turn out trillions of units annually at its new Groton, Conn. plant.

But unless first appearances are misleading, it must be noted that synthetic vitamin A as such, is old hat. Pfizer has been making the synthetic vitamin for quite some time, and so has Hoffman-LaRoche *(CI, Dec. 1950, p. 876)*, Merck, and Eastman Kodak. Dry, crystalline vitamin A however, is another story. Because of its susceptibility to oxidation, the material has always appeared on the market in an oil-stabilized form.

Pfizer has licked the problem in an ingenious fashion. Dry vitamin crystals are coated with gelatin by a new process. Crystals of more than 99% purity are coated to give a bulk powder with a potency of 500,000 units per gram. About 20% of this material is vitamin, the remainder gelatin. The product is practically tasteless and odorless, and retains its shelf-life over long periods of time. Less than 4% deterioration results from 1200 hours exposure to air at high temperatures—stability previously unattainable with hypersensitive vitamin A crystals.

Solid advantage: Pfizer hopes to outsell the more conventional commercial forms of the vitamin with some strong sales points: A synthetic substance, it eliminates the problems of quality and supply associated with the malodorous natural fish oil concentrates. In addition, it is cheaper, easier to package, and needs no refrigeration in storage. Its major advantage over other synthetics—which take the form of oil solutions—is the

VITAMIN A SYNTHESIS: Gelatin coat provides "sell."

solid state. Result is an expanded range of commercial application. The novel crystalline vitamin may be used in dry preparations without fear of oxidative deterioration. This should simplify tableting and take some of the play away from the familiar vitamin A capsule. Complex nutritional formulations (i.e. multivitamin tablets) will also benefit from the new ingredient, although synthetic vitamin A in oil has in the past been incorporated into multivitamin tablets with good results.* Fortification of foods is another vitamin A market which should get a boost from the coated material. Sugars, chocolate drinks, baby foods, dog food, powdered milk, etc., are just a few possibilities. Animal feed supplements look like the largest potential outlet, but if all goes well in Washington, oleomargarine will get the vitamin to the tune of 15,000 units per pound.

Using a twelve-step synthesis, Pfizer makes its vitamin A by a process similar to that developed by Hoffman-LaRoche. Citral, acetone, formaldehyde, and acetylene are principal starting materials; glass-lined equipment is used exclusively. Vitamin A acetate goes into the gelatin-coated powder, although the palmitate ester, with a potency of 1.6 million units per gram, is also made for liquid products. These liquids are unique in that they contain no oil—just the vitamin, related substances, and an antioxidant.

Research on protective coatings for pharmaceuticals is continuing. Waxy emulsifiers and carboxymethyl cellulose are under scrutiny as substitutes for gelatin. Also, Pfizer is eyeing the possibility of coating nutritional and pharmaceutical substances which are not compatible so that they may be combined in therapeutic preparations without the danger of interaction. Another line of study is aimed at producing higher-potency powders by cutting down the gelatin content.

The gelatin coating process has been patented by Pfizer, but it is conceivable that the company would consider licensing the patent to other manufacturers.

* Multivitamin tablets containing vitamin A in oil meet U. S. Army specifications calling for an initial potency equal to 120% of requirements and a potency of 100% at the end of 1 year.

Inorganic Paper

After many false starts researchers at the U. S. Bureau of Standards and Naval Research Laboratory have at last produced a satisfactory paper from glass fibers and from mica. In addition a procedure has been developed for improving the quality of low-grade domestic asbestos.

For years cellulose has been synonymous with paper. With the single exception of asbestos, inorganic fibers have failed to produce paper without admixture of an appreciable quantity of cellulosic material. Now B. W. Scribner of the Bureau of Standards and Parry Bergstrom,* E. A. Ramskill and T. D. Callinan of the Naval Research Laboratory have made paper from glass fibers and mica as well as developing a method for purification of impure U. S.-mined asbestos.

Glass paper, if and when it is commercially produced, will have a variety of uses. It lends itself to manufacture of high-quality electrical insulation with a very low power factor. For example, its resistance to combustion (800 C is the upper temperature limit) makes it ideal for wrapping air-cooled transformers.

Mine Safety Appliances Co. is investigating possible use of glass paper in gas masks. At a thickness of only 1/100", it is an efficient air filter. A major advantage is that masks made from glass paper remain unclogged hours longer than ordinary gas mask filters.

Manufacture of paper from glass fibers has engaged the attention of researchers for years. But old-time paper men refused to believe that paper could be made from glass fibers alone. They felt that proper operation of paper machines required the presence of small quantities of wood pulp. Such processes have been patented.

But mixtures of glass fibers and wood pulp still have many of the drawbacks of ordinary paper. Cellulose is still present, even though the quantity may be small. Use of such a paper in filtering bacteria and viruses, for example, tends to contaminate the product. When used as an electrical insulating material, its relatively high power factor heats the insulation and causes a loss of power.

Mica paper: The same group at the Bureau of Standards and the Naval Research Laboratory has also produced paper from mica. Such paper, according to NRL, is a superior dielectric for capacitors. Present kraft paper condensers, do not operate satisfactorily above 85 C. But the new mica paper withstands heat, is stronger, and has a greater capacitance.

The volume of production required for this use is small but of greatest military importance. Not only can mica paper substitute for kraft paper but an appreciable saving can be made in scarce condenser-grade mica.

Production of mica paper came out of experiments designed to split mica in a paper beater. These tests were made because of the observation that asbestos readily separates into the individual fibers when its suspension in water is passed through the beater.

Wet beating of scrap mica converts the layer structure of mica into discrete particles. Although non-fibrous, they can be floated onto the wire screen of a Fourdrinier paper machine to produce a paper without use of additives.

Asbestos paper has been prepared for years from asbestos fibers. But the low-grade asbestos that can be produced from domestic sources has such a high iron content that it is unsuitable for the preparation of asbestos paper for electrical insulation.

B. W. SCRIBNER: Glass, not cellulose.

cleaning mixtures based on

Nacconol*

sell faster to "milk bars" and fountains

To wash 'em fast and clean your mixtures need a "balanced" synthetic detergent.

NACCONOL is the ideal synthetic to add because it dissolves quickly in hot or cold water; boosts the cleaning power of phosphates and alkalis; emulsifies greasy soil instantly; loosens protein soil effectively; keeps these soils from re-depositing.

Result: Glasses and china come sparkling clean in a jiffy!

We'll be glad to work with you on a low-cost formula; to supply samples in flake, powder or bead form; and to quote on your needs. Write, wire or phone our nearest office for prompt service.

NATIONAL ANILINE DIVISION

Remember: NACCONOL is America's first mass-produced, low priced synthetic detergent . . . still leads in production, performance and profits for mixers —a dependable source of supply now and into the future.

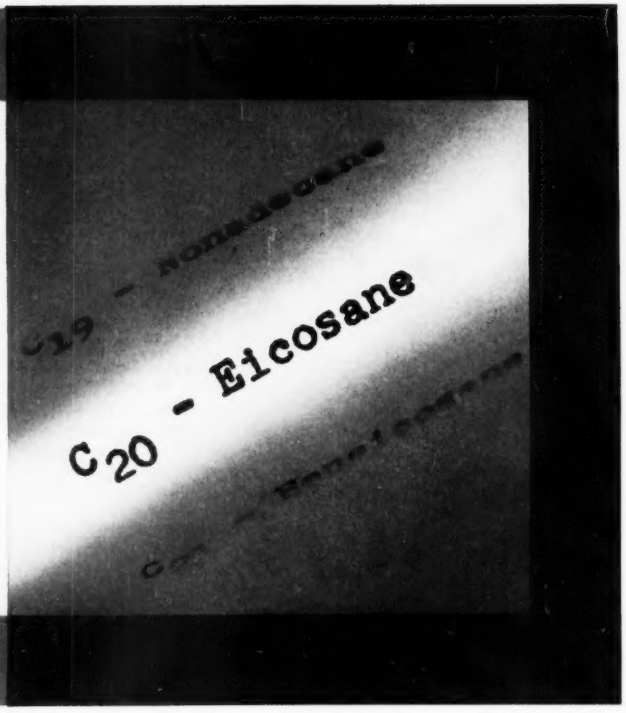
*Reg. U. S. Pat. Off.

WHAT NEW FIELD

IS OPENING HERE?

Look into

Technical Eicosane



With this hydrocarbon you may be on the research road to new products with new uses. Technical Eicosane is predominantly a straight chain paraffin containing an average of 20 carbon atoms.

Eicosane can be highly chlorinated to yield a more stable and less viscous product than when ordinary waxes are used. Further, it chlorinates more easily. The end product can be used in fireproofing, leather treating, etc. Monochlorinated Eicosane can also be used as an alkylation material where long side chains are desirable. Eicosane can be oxidized and will react with chlorine and sulfur dioxide.

Can you carry the ball from there? Write us for further information — The Atlantic Refining Company, Chemical Products Section, Dept. B-13, 260 S. Broad St., Philadelphia 1, Pa.

Without obligation, please send me further information on

TECHNICAL EICOSANE

*Name*_____

*Company*_____

*Address*_____

ATLANTIC PETROLEUM CHEMICALS

In the East and Midwest
THE ATLANTIC REFINING COMPANY
Philadelphia • Pittsburgh • Providence • Charlotte • Chicago

On the West Coast
L. H. BUTCHER COMPANY
San Francisco • Los Angeles • Seattle • Salt Lake City • Portland

In Canada
NAUGATUCK CHEMICALS . . . Division of Dominion Rubber Co., Ltd.
Elmira • Montreal • Toronto • Windsor • Winnipeg • Saskatoon • Calgary

Cleanup of this low-grade material is accomplished by the Bureau and NRL by a wet-cleaning process. Normal cleaning methods utilize a dry-cleaning procedure that fails to remove the iron.

The new process forms a white iron-free product from the usual dirty gray material. To do this a thick slurry is pumped tangentially into the top of a vertical section of pipe. The slurry rotates around the outer periphery of the pipe, gradually working downward and finally passing up through the center of the pipe and out. The iron-containing compounds and other heavy materials are centrifuged to the outer portion of the pipe and eventually settle to the bottom from which they can be removed.

Effluent from the top of the pipe is screened to separate the asbestos for drying. Asbestos paper made from this product is a fine white material which is an excellent dielectric.

Papers from inorganic fibers have not as yet been thoroughly evaluated, but promise to find use in filtration, as electrical insulation and for a host of other applications.

Atom Power Far

Civilian power from nuclear reactors is not just around the corner, Lawrence R. Hafstad, AEC's reactor development head, said this month. Industry's interest in private participation (CIW, Feb. 17, 1951) is long-term, doesn't imply immediate commercialization of nuclear energy.

Hafstad pointed out that the Atomic Energy Commission's reactor development program is pretty well up to schedule. The question is no longer whether a reactor can be built, but rather what kind of results can be expected—and that will have to wait until the four now nearing completion are "debugged" and operated.

Full-scale operation will show how well technical obstacles have been overcome—such obstacles as finding materials that resist extremely high temperatures, are transparent to neutrons, and don't deteriorate under radiation; safeguarding instruments and personnel; attaining higher-than-ordinary heat transfer rates; and disposing of radioactive wastes.

Economic problems greater: Even assuming that the technical problems are licked, there's still a considerable gap between the initial cost of a nuclear reactor and that of a conventional power plant: $1,400 per kwh installed capacity of a ship propulsion reactor as against $133 for an ordinary power plant.

L. R. HAFSTAD: A baker's dozen barriers to nuclear power.

There's not much likelihood of cutting the $133 figure, but on the other hand there's lots of room for cutting on the higher figure. The $1,400 represents high initial development costs; expense of meeting specific—and tough—naval requirements; high cost of reprocessing fuels; lack of volume production; and extraordinary expenses inherent in extreme safety and security precautions. Elimination of these may well cut the figure by a factor of two or three.

But initial cost isn't the whole story. Assuming an outlay of $20 per gram for uranium 235, fuel cost is 1 mill per kwh compared with 2 mills for chemical fuels. The $20 figure will undoubtedly rise as high-grade uranium ores are depleted.

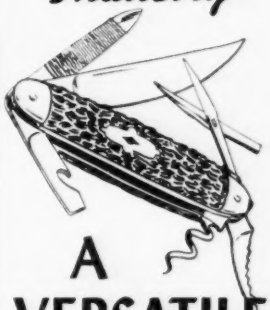
Considering these facts, it appears that capital expenditure for nuclear power plants will be several times the investment in conventional facilities, and operating costs will be little if any lower.

By-products the key: Salvation for the program lies in the by-production of plutonium, tritium, or some other nuclear fuel in a "breeder" reactor. If such a unit is practicable, value of the by-product would offset much of the operating cost, providing power at a reasonable rate.

Even this won't usher in the atomic era. Major charges will still be carried by the military need for plutonium. Only if and when we can produce fissionable material which will pay for its own production cost when used as power, will civilian atomic power be an economic reality.

More red tape: Industrial partici-

SEBACIC ACID
An UNUSUAL tool for the Chemical Industry



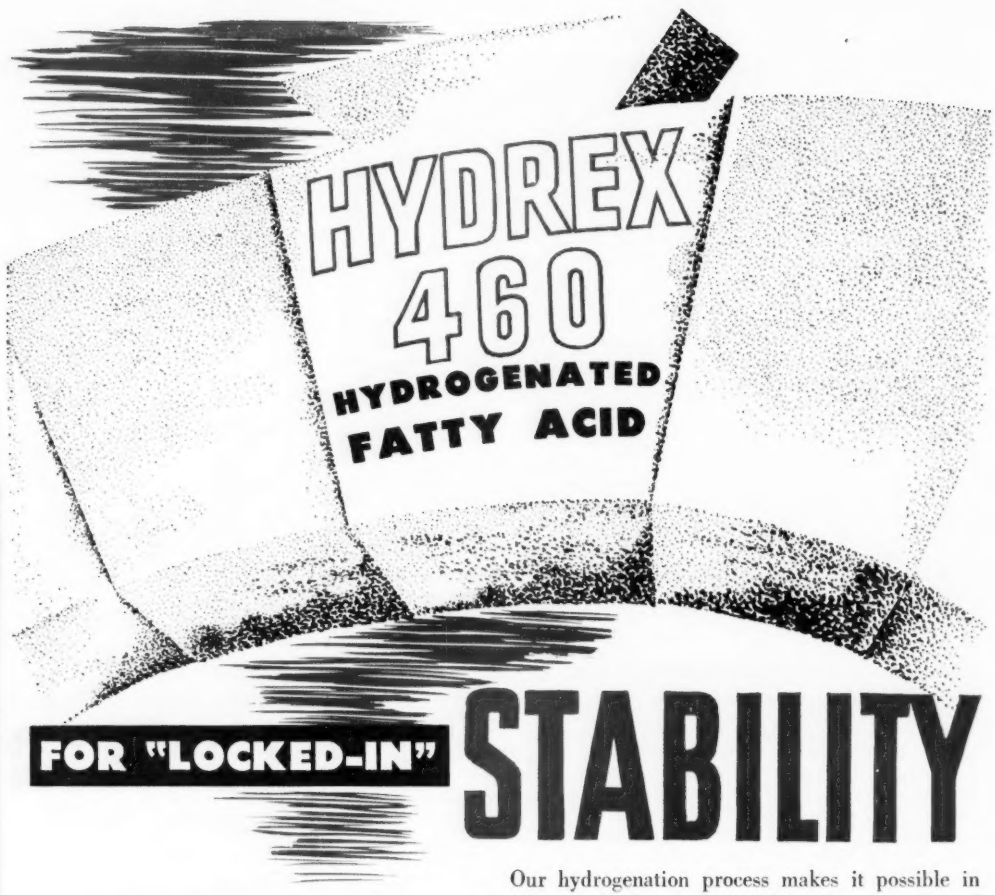
A VERSATILE DRY
FREE-FLOWING DIBASIC ACID

HARCHEM
PLASTICIZERS

*HARFLEX 500
DICAPRYL SEBACATE
DICAPRYL ADIPATE
DICAPRYL PHTHALATE
DIBUTYL SEBACATE
DI-ISO-OCTYL SEBACATE
DI-ISO-OCTYL ADIPATE
DI-ISO-OCTYL PHTHALATE
DIBENZYL SEBACATE
DIHEXYL SEBACATE
DIHEXYL ADIPATE
DIHEXYL PHTHALATE
DIMETHYL SEBACATE
**BUTYL BENZYL SEBACATE
CAPRYL BENZYL SEBACATE

*Trade Mark **Patent Pending

HARDESTY CHEMICAL CO., INC.
41 East Forty-second St., New York 17, N.Y.



FOR "LOCKED-IN" STABILITY

HYDREX 460 SPECIFICATIONS

Titre	(134.6—140.0°F) 57.0—60.0°C
Color 5¼" Lovibond Column (max)	4 Yellow—0.4 Red
Iodine Value (Wijs)	1—4
Free Fatty Acid (as oleic)	100—103%
Acid Number	199—205
Saponification Value	201—207

Our hydrogenation process makes it possible in regular production runs to reduce the proportion of unsaturated compounds to a minimum . . . greatly improving the stability of the fatty acid *and the end product.*

For example, Hydrex 460 Hydrogenated Animal Fatty Acid is a water-white, stable, saturated fatty acid that is relatively rich in stearic acid (about 70%), with about 30% pralmitic acid and practically free of oleic acid. Yes, with our hydrogenation technique, we are producing high melting point, low iodine value fatty acids with controlled composition. Manufacturers of fatty acid esters, metallic stearates, special lubricants and other products where *stability* is essential, should investigate medium-priced Hydrex 460 Hydrogenated Animal Fatty Acid.

W. C. HARDESTY CO., INC.
HARDESTY PRODUCTS ARE INDUSTRY'S KEYSTONE
ESTABLISHED 1926
41 EAST 42nd STREET, NEW YORK 17, N. Y.

FACTORIES: DOVER, OHIO TORONTO, CAN.

pation in attacking these difficulties is still beset with vexing problems.

One of these is technical personnel. Most of the qualified nuclear physicists are already employed in the present program or in teaching, and thus the need for an extensive training program is apparent.

Second, since the government will not be divorced from nuclear technology in the foreseeable future—if ever, indeed—industrial firms must resign themselves to operating under arbitrary decrees, justifiable though they may be. Another burden of cooperation with the government is the fact that Congress hates to commit itself for more than the current fiscal year; but industrial development of atomic energy, involving the expenditure of millions of dollars, requires firm commitments far in the future.

Legal problems are also knotty. First of all, there's the question of dividing the pie fairly. Just as every citizen can't have his share of the radio spectrum for private broadcasting, neither can every citizen have a finger in atomic development. Whom to admit and whom to exclude from the nuclear orbit will undoubtedly excite many tempers.

Finally, there's the international situation. The United Nations is involved in atomic development, so some problems are bound to arise over which even the U. S. Congress won't have complete jurisdiction.

On the whole, it appears that a multitude of decisions will have to be "muddled through" and a baker's dozen barriers cleared before industry can generate and use nuclear energy.

Patent Puzzle

Recent decision of the U.S. Patent Office's Board of Appeals may eliminate the need for comparative tests in patent applications involving isomers of known compounds. The ruling, which should set a precedent, shifts the bulk of the legal burden to the patent examiner.

Cause of the issue was a patent application by Upjohn inventors Kolloff and Levin,* claiming 2-benzyl-methylamino-indane and related compounds. Specification filed by the hopefuls asserted the compounds to be effective bronchodilators having little or no effect on blood pressure.

Patent was denied on the basis of indanylbenzylmethylamine data used as a reference to appraise validity of the claim. The examiner believed the reference to include the compounds applied for. He stated, "such term [indanylbenzylmethylamine] without qualification, includes within its purview the (claimed) compound. It is at least a position isomer."

Reasoning behind the negative judgment is as follows. The claim was anticipated by the reference. In the opinion of the examiner, there was insufficient evidence in the case record to establish that the claimed compounds (2-benzyl-methylamino-indane, etc.) "differ specifically from those of the reference [indanylbenzylmethylamine] in the matter of the position of the amino group on the indane ring." Even if it were established that the claimed compounds were not identical with the reference, but isomers, the claimants did not establish patentability because they failed to show that the claimed chemicals possess unobvious properties not shared by the reference.

Overruled: Board of Appeals in a unanimous opinion overruled the examiner's decision on evidence presented by Kolloff and Levin showing that the reference (indanylbenzylmethylamine) really referred to 1-benzyl-methylamino-indane and therefore did not encompass the compounds they were claiming. The board was also swayed by the examiner's lack of evidence proving that the claimed isomers had ever been prepared or mentioned in the literature. In response to the examiner's opinion that it was incumbent upon the claimants to prove that their compounds possess unobvious properties not shared by isomers, the board noted that the applicants had stated (and established by affidavits) that the claimed compounds were unusual because of their ability to dilate the bronchi without noticeable effect on blood pressure.

In the words of the final ruling, "The references relied upon by him [examiner] fail to even remotely suggest that the compounds in question would be expected to possess such properties or that they may be used to advantage as bronchodilators. As a matter of fact, the references do not disclose any utility for the compounds in question except as intermediates or reactants for the preparation of other derivatives."

Unpredictability is the key: Concluding, the board opined that an inventor is entitled to a patent on a new material because of its superior characteristics which could not in any way be predicted from known properties of reference materials.

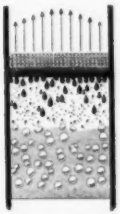
* Ex parte Kolloff & Levin 88 U.S.P.Q. 330, Febr. 24, 1951.

New Method of entrainment separation cuts costs and speeds production

By applying the principle of impingement filtration to liquid-gas separation processes, Metex Mist Eliminators have effectively reduced costs, increased throughput and improved end-product quality in evaporators, scrubbing towers and similar refining operations. Baffles, centrifugal chambers and additional head room are not required, nor is it necessary to slow down operations to secure 90% or better entrainment removal.

Metex Mist Eliminators

A Metex Mist Eliminator is a pad, built up to the desired thickness from multiple layers of wire mesh, *knitted* —not woven—of corrosion-resistant metal. Constructed in sections for easy assembly, and cut to fit, Mist Eliminators are installed inside refining equipment and across the line of gas flow.



Having a high free volume (often 98%) there is practically no impedance to flow, yet the multiplicity of wires effectively prevents "straight line" passage of gases, and "wipes out" the entrained liquid. As this impinged liquid accumulates, it grows into drops which break off and fall back against the rising flow, allowing the gas to pass through, freed of all entrainment.

Applications

Installations to date have been largely in petroleum refining and petro-chemical operations where increased production, purity of output and lowered costs have been repeatedly demonstrated. That the use of Metex Mist Eliminators in other operations where purification of gases is essential, will be similarly effective is indicated by this record of performance.

Our engineers will be glad to consult with you on the possible adaptability of Mist Eliminators to your processing operations. A letter, addressed to Mr. R. L. Hartwell, Executive Vice President, outlining briefly your process and the products involved, will bring a prompt reply and a copy of our brochure, "Metex Mist Eliminators". No obligation of course.

METAL TEXTILE CORP.

635 East First Ave. Roselle, N. J.

Dependable!

GERSTHOFEN WAXES

FORMERLY I. G. WAXES

By demanding all of our available stock of these popular waxes, American industry has proven their unique worth and dependability. This has resulted in production falling behind demand, which has caused excessive delay in filling orders.

But don't allow our present position to keep you from becoming acquainted with Gersthofen Waxes. Despite our temporary shortage we can still help you with laboratory development work. We shall be glad to send you samples and complete information upon request.

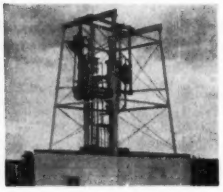
DISTRIBUTED THROUGH

GEORGE H. LINCKS INC.

312 BRIDGE ST., BROOKLYN 1, N. Y.

IS VACUUM THAT'S 99.99% PERFECT

good enough for *your* process?



Four-stage experimental Evactor

THIS degree of vacuum is easily obtained with the Croll-Reynolds four or five stage steam jet EVACTOR, with no moving parts. Each stage from a mechanical standpoint is as simple as the valve that turns it on. Numerous four stage units are maintaining industrial vacuum down to 0.2 mm. and less, and many thousands of one, two and three stage units are maintaining vacuum for intermediate industrial requirements on practically all types of processing equipment.

By permitting water, aqueous solutions or any volatile liquid to evaporate under high vacuum and without heat from an outside source, enough BTU's can be removed to chill the liquid down to 32°F, or even lower in the case of solutions. This is the principle of the Croll-Reynolds "Chill-Vactor." Hundreds of these have been installed throughout the United States and in several foreign countries.

An engineering staff of many years experience has specialized on this type of equipment and is at your service. Why not write today, outlining *your* vacuum problem?

CROLL-REYNOLDS CO., INC.

17 John Street, New York 38, N. Y.

CHILL-VACTORS STEAM JET EVACTORS CONDENSING EQUIPMENT

CROLL-REYNOLDS

WHAT'S NEW. . . .

Odorless Water

Malodorous sulfides are removed from water supplies with strongly basic, resinous anion exchangers.* In the past, sulfides have been removed by an oxidation process. This method, however, had one major disadvantage: difficulty in operating because of its sensitivity to small variations in the sulfide content of the entering water.

Hydrogen sulfide concentrations as low as 0.5 parts per million produce an objectionable taste and odor in water, and countercurrent use of ion exchange easily reduces the concentration to a level below this point.

Regeneration: The exchanger is regenerated by treatment with a mixed solution of salt and sodium bicarbonate, followed by a water rinse to rid the resin of chlorides.

Use of the sodium form of another ion-exchange resin, Amberlite IR-120, in the same unit will remove calcium and magnesium as well. Both resins are regenerated by salt and sodium bicarbonate, and combined operation does not add to the cost of regenerant chemicals.

Petro-Ammonia

Today crystalline by-product ammonium sulfate is being produced by a petroleum refinery. Using waste sludge acid to remove the ammonia formed by cracking high-nitrogen crude oil at its Torrance, Calif., refinery, General Petroleum Corp. is producing 11 tons per day of ammonium sulfate.

For years it has been known that certain of the California crude oils have had an appreciable nitrogen content. And a large portion of this nitrogen ends up as ammonia in the gases remaining after removal of the hydrocarbon constituents of the cracker product. At General's refinery it turned up with the water-soluble sulfides prior to their release to the waste-disposal system. In effect, this unit is a waste disposal system where semi-waste sludge acid is used to remove an annoying ammonia waste.

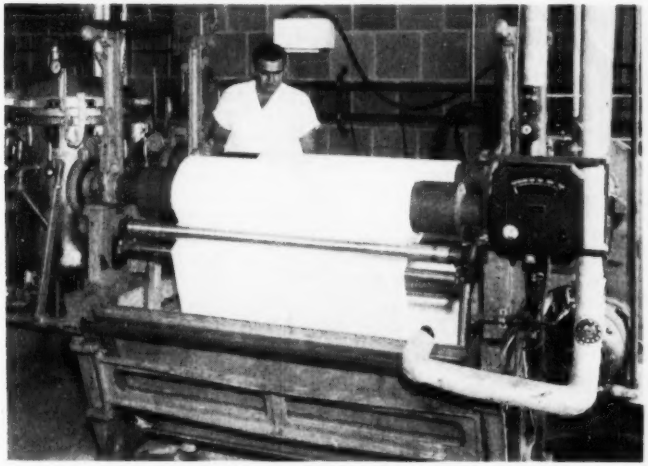
Whether this development will be utilized by other refiners is entirely a question of whether the crude oil being processed contains an appreciable nitrogen content. Most of the crudes on the Gulf Coast, the nation's largest oil-producing area, contain little, if any nitrogen; so it is not likely that the process will have large application there.

* E.g., Rohm & Haas's Amberlite IRA-410, Dow's Dowex 1 and 2, National Aluminate's Nalcite A1 and A2, Permutit's Permutit S.

New Jobs for Zirconium

· Zirconium chemicals are consistently expanding their market in the textile industry.

High combining capacity and strong affinity for oxygen suit them for jobs like waterproofing, mordanting, and fireproofing.



PROCESSING CLOTH: Zirconium makes its bid in a competitive market.

Steady gains registered by zirconium chemicals in textile applications over the past five years, is proof of their growing acceptance by the industry. Combining power of the zirconium atom has been seized upon to serve as the foundation for a variety of useful jobs. Of these, water-repelling has enjoyed the greatest commercial success to date.

Zirconium ions in water solution show a remarkable affinity for many kinds of fabric. This phenomenon applies both to natural fibers and synthetic. Reason: zirconium's special attraction for oxygen facilitates the formation of chelate rings in compounds with adjacent or vicinal oxygen atoms. Cellulosic vegetable (cotton) fibers fulfill the requirements for chelation. Even the protein animal fibers (silk, wool), and protein-like synthetics (nylon, etc.) react with zirconium. Net result is a metal-containing fiber, endowed with various new and desirable properties. Flame-resistance is one of these.

Submicro anchor: Although zirconium enters into the structure of the fiber, it still retains the ability to coordinate many reagents and anchor them to the parent molecule. It takes up dye radicals to function as a mordant, and attaches long-chain fatty acid anions to form a surface film of hydrophobic soap. Water-repelling films produced in this manner are submicroscopic and have little effect on the physical characteristics of the fabric.

Hydrophobic zirconium films prevent penetration of water, but do not clog the fabric's pores. Vapors circulate normally, overcoming the familiar clamminess associated with rubber or resin-waterproofed apparel. On the debit side, film processed garments do not retain their hydrophobic nature under heavy wear as well as more massively coated (with rubber or resin) materials. However, they make fine raincoats, military uniforms, table cloths, shower curtains, tents, awnings, laboratory jackets, etc.

The acetate salt is the most popular zirconium compound for textile processing, but ammonium zirconyl carbonate is also used when the job calls for a neutral or slightly basic medium. Best results in any case are achieved by proper formulation with auxiliaries (soaps, waxes, etc.), and closely controlled operating conditions.

Zr vs Al: Zirconium chemicals for the textile industry are in direct competition with more conventional aluminum compounds. On paper, it appears that the former fare well costwise; zirconium acetate for example, is cheaper than aluminum acetate from the standpoint of metal content. But the real proof of economy can only come from actual industrial experience. Not enough technical or cost data is available today to justify a valid comparison of the two chemical families.

As a textile processing agent, zirconium has only scratched the surface. Its future share of the wealth will be determined by its practical success in many indicated, but as yet unproved applications.

Decay Stopper

Ozark-Mahoning Co.'s new sodium monofluorophosphate is exciting considerable interest as an inhibitor of dental caries. It is as effective as sodium fluoride and much less toxic.

Discovery of these unexpected virtues was made by a research group at the University of Rochester. Judging from analogy with the cavity-preventing prowess of sodium fluoride, it would seem logical that a not too distant relative such as the fluorophosphate would exhibit similar activity. But its low toxicity is a complete surprise.

Tests conducted with laboratory animals show the material to have an acute toxicity of 570 mg. per kilogram of animal when administered orally. This is about 85% less than that of sodium fluoride.

Phosphate group appears to be the deciding factor in the striking depression of toxicity. In neutral or slightly alkaline solutions, sodium monofluorophosphate yields only the monofluorophosphate ion. This ion does not give any of the analytical reactions of the fluoride (or the phosphate) ion. Apparently the compound makes combined fluorine available to the teeth without further conversion to toxic fluoride ion. In addition, the inclusion of phospate results in a substance that more closely resembles the natural calcium phosphate of the dental enamel.

Commercial application in dietary and dental hygienic fields is a good bet.

SUNSHINE STATE POTASH
A PRODUCT OF NEW MEXICO U.S.A.
Reg. U. S. Pat. Off.

MURIATE OF POTASH
62/63% K_2O 50% K_2O Min.

MANURE SALTS
20% K_2O Min.

UNITED STATES POTASH CO., Inc. 30 Rockefeller Plaza, New York 20, N. Y.

NAMEPLATE PROBLEMS?

Send for this Manual of...

MEYERCORD DECAL NAMEPLATES

HOW TO SOLVE NAMEPLATE PROBLEMS ON ANY SURFACE

Most useful nameplate manual ever offered! Shows hundreds of uses for durable, washable Decal nameplates—as trademarks, instructions, charts or diagrams—in all sizes, colors and designs. Application is fast, easy, economical. On metal, glass, wood, china, plastic, leather, rubber, crinkle—curved, flat or flexible surfaces, Meyercord Decals provide low cost permanent identification.

FREE!

WRITE FOR YOUR FREE COPY BUSINESS LETTERHEADS, PLEASE, DEPT. 41-3

The MEYERCORD Co.
World's Largest Decal Manufacturer
5323 W. LAKE ST. CHICAGO 44, ILL.

RESEARCH . . . . . .

Naphthenate quats: Nuodex Products, Inc. have come up with a group of alkyldimethylbenzylammonium naphthenates showing promise as germicides and pesticides. They are effective in protecting casein paint against decay, and compatible with varnishes, water-repellants, plastics, oil paints, linoleum, waxes, polishes, etc. Preliminary results are encouraging for use as crop-pesticides and fabric preservatives.

•

Penicillin synthesis advanced: Researches at Massachussetts Institute of Technology report a practical synthesis for β-lactams containing an amino group on the α-carbon. A characteristic feature of the accepted structure for penicillin, this configuration previously lacked a good working synthesis. Reaction of a diacylaminoacyl chloride and benzalaniline in the presence of triethylamine, gives good yields of the desired product.

•

Cheaper fertilizer: Novel process for making ammonium sulfate, developed by Socony-Vacuum Oil Co., may cut the cost of agricultural fertilizer.

Concentrated sulfuric acid and liquid coolant are sprayed into an atmosphere of ammonia at a temperature of about 275 C. Final product is substantially dry and free flowing.

•

Floating laboratory: A converted World War II landing ship has been outfitted by the navy as a mobile epidemic control laboratory. Conceived primarily as an aid to typhus control, the ship will be dispatched to affected ports at the first sign of epidemic disease. Large quantities of DDT will be on hand for associated pesticidal operations.

•

Foaming agent: Modified hemicellulose extract, now in pilot-plant production by Masonite Corp., has a market in foamed glues and insulation, tracer and chemical foams, low density paper, and low density concrete, mortar and cements. Product called Masonoid CTM competes with soap bark, but should be cheaper and more easily available when commercial production gets under way. Freedom from sulfur containing compounds is another advantage over analogous wood-derived surface active agents.

For ECONOMICAL, LONG-LASTING PROTECTION of Equipment and Property

YOU'LL find Pitt Chem Cold Applied Tar Base Coatings ideal for a wide variety of protective jobs. Made from coal tar pitch, one of nature's most impervious protective materials, they're easy to apply, relatively low in cost, and effective against most corrosion conditions.

The uniform top quality of Pitt Chem Cold Applied Tar Base Coatings is assured by the close production control which results from our completely integrated manufacturing operation. If you're looking for an economical, dependable way to add years of service to your plant's physical assets, see your nearest Pitt Chem Man . . . or write for new booklet, "Control Corrosion through Pitt Chem Protective Coatings".

PITT CHEM

Industry's Most Comprehensive family of Protective Coatings

- ★ Hot Applied Tar Base Coatings
- ★ Cold Applied Tar Base Coatings Series 100
- ★ Alkyd Base Coatings—Series 200
- ★ Chlorinated Rubber Base Coatings—Series 300
- ★ Vinyl Base Coatings—Series 400
- ★ Phenolic Base Coatings—Series 500

See Your Nearest Pitt Chem Man

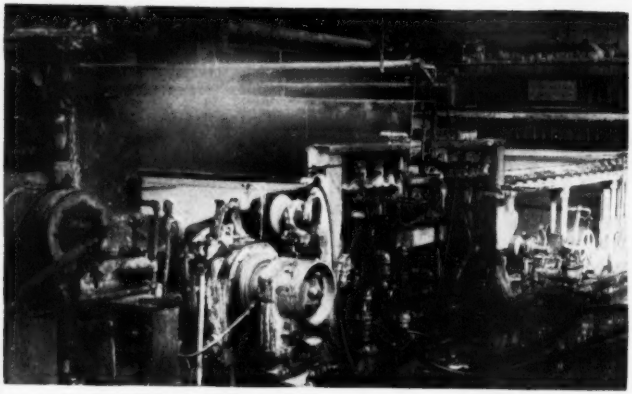
PROTECTIVE COATINGS DIVISION

WBD 3490C

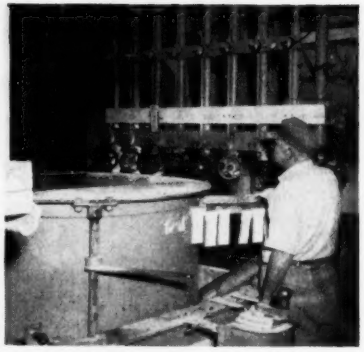
PITTSBURGH COKE & CHEMICAL CO.

GRANT BUILDING • PITTSBURGH 19, PA.

OFFICES: New York • Chicago • St. Louis • Tulsa • Houston • Los Angeles • San Francisco

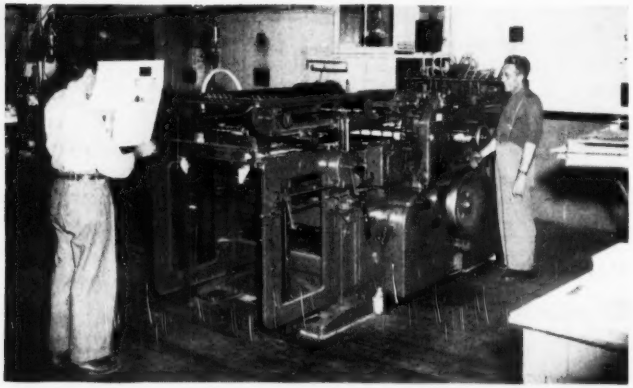


1 PAPER STARTS as pulp slurry in the "head box" at right, is fed onto papermaking fourdrinier screen from which water drains, leaving paper mat. Wet sheet is then squeezed and run through steam-heated dryers.



2 "COLOR" or coating material is prepared. Tank is actually movable scale operator sets under different valves to make mix.

7 GUILLOTINE TRIM follows inspection of each sheet as it comes from cutting line. Sheets stacked at right have been trimmed.



8 TEST PRINTING is run on every roll of paper before shipping. Warren maintains a print shop to check the paper's printing qualities.

Paper Coating With

One of the fastest growing outlets for butadiene-styrene latices is as binders in making clay coatings for quality papers. Dow Chemical Co. has doubled its latex capacity with a recently-completed second plant (Freeport, Tex.). Its Latex 512K, used in coatings operations by such paper companies as the S. D. Warren Co., comprises a large proportion of this production.

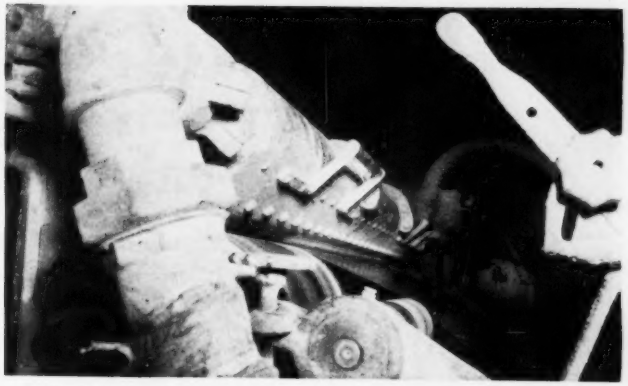
Papers of the quality turned out at Warren's Westbrook, Me., plant are surface coated with a mixture of clay and adhesive. The fine clay particles fill in the irregularities in the paper, form a smooth surface that looks better and prints better than uncoated paper.

Traditionally casein, starch and other natural materials have been used as the binders for the clay. The development of synthetic latices of the 512K type, however, has given paper makers a new material that can be used alone or in combination with the older adhesives to give superior coatings. Not only is the synthetic as good a binder as those previously used, but it produces a paper of greater flexibility and water resistance.

"Color" preparation: "Color," as the paper man calls the coating material, is not just a simple mixture of clay and adhesive. Warren, for example, makes its paper to a standard shade. Several pigments may be blended with the clay to make the white a little to the pink or blue side. More than one grade of clay too will probably go into the mix depending upon the body required.

Generally 512K will be blended with starch, casein or soya protein to form the adhesive binder that is added next. It can, however, be used alone for some applications. Antifoamers, leveling agents and

3 FORMULA is mixed in color room. Then tanks, hatches closed, are emptied by air pressure. Color is strained (1.) into storage.



4 AIR KNIFE COATER is one machine for applying the prepared color to the paper. Partly submerged color roll coats paper, and as paper travels over top roller, a very fine air blast blows off excess. Only one side at a time is coated.

. . . New Latex Binder

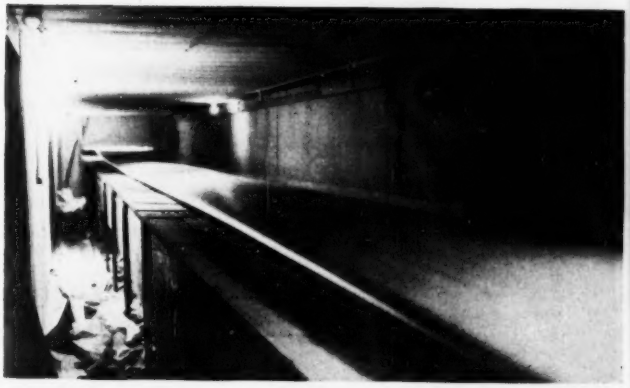
occasionally lubricants complete the formulation. This is mixed, screened and pumped to storage.

Coating application: One paper mill may use a number of different coating machines to apply the color to the paper. Among the more popular is the "air knife" or "air doctor" coater. Here color is applied from a partly immersed roller, and then the excess is blown off by a carefully controlled fine blast of air. This gives a coating of excellent uniformity and appearance. Another machine in wide use is the "squeeze roll double coater" which coats both sides at once.

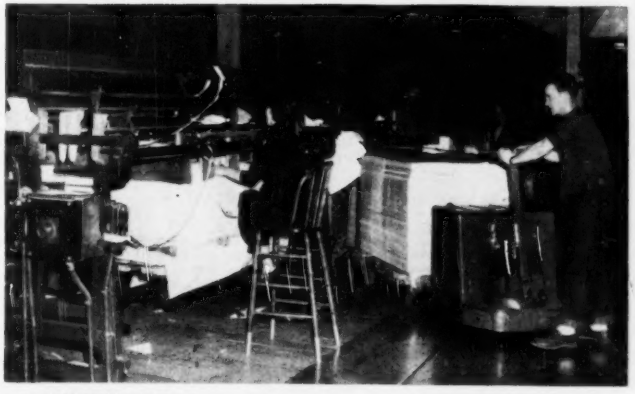
After coating, the paper may be dried in various ways. Long, hot air drying tunnels are often used, especially for paper coated by the "air knife" method. Festoon dryers, which carry the paper suspended from sticks in long loops through a warm room, are also in common use.

Big ironer: Very important to the quality of the paper is the final step of supercalendering. The coated paper is passed through a series of alternate polished steel and very hard cotton rolls. These smooth the coating on the paper, making it more receptive to print, and bring up the gloss of the paper. Because the synthetic latices are thermoplastic, they give a smoother, more glossy and more compact coating than is possible with other adhesives.

Plants producing high quality paper for fine printing make inspection of every single sheet by experienced sorters a standard control. Warren goes even further than that. It has an elaborate print shop where it checks the printing qualities of every roll of paper on commercial equipment. With the new latex binders, soft, flexible papers having excellent printing properties are the rule.



5 COATED PAPER is suspended on hot air as it travels over 100 ft. on the hot air floater. This method of drying keeps the finish unmarred.



6 FINISHED ROLLS are cut into various sizes. Prior to this, the dried paper has been calendered—passed through heavy rolls—to smooth its surface.

KRAFT BAG

made-to-order heavy-duty • multi-wall shipping sacks

SEWN VALVE

FLAT SEWN VALVE

PASTED VALVE

FLAT SEWN OPEN MOUTH

SEWN OPEN MOUTH

PASTED OPEN MOUTH

2 to 6 PLY

PRINTED OR PLAIN

SPECIALIZED DEPENDABILITY

We are dependable as a source and as a service because we are self-sufficient, self-sustaining specialists from pulp to printing.

We produce every bag component in our own mills . . . the kraft paper, the laminated kraft, the wet strength kraft, the crepe kraft, the kraft tape, the crepe sleeves and L. C. sleeves; we mix our own pastes; make our own printing plates; and print on our own modern presses . . . *everything in a Kraft Bag is Kraft's own*, except the cotton sewing thread.

And we set exacting standards of quality in the making of our products so they may prove worthy of yours.

WE INVITE YOUR INQUIRIES

KRAFT BAG CORPORATION

GILMAN PAPER COMPANY SUBSIDIARY

630 Fifth Ave., New York 20, N.Y.
Western Sales Office
Daily News Bldg., Chicago 6, Ill.

Gilman PAPER CO.
- St. Marys Kraft Corp.
- Grommet Twin Div.
- The Celluseal Corp.
- Kraft Bag Corp.

Plants at St. Marys, Georgia and Gilman, Vermont

Send your product to market in a "KRAFT BAG"—*the container for a thousand uses!*

SPECIALTIES . . . . . .

Managing director for CSMA: Continued broadening of the scope of its activities and increase in membership have made the appointment of a managing director necessary for the Chemical Specialties Manufacturers Association. H. W. Hamilton, who has acted as association secretary without compensation for the past eight years, has been named to that post. Mr. Hamilton will sever his connections with the New York company bearing his name, and will assume his new CSMA duties September 1.

This is the second important move in the organization of this leading trade association of the specialties field within the past two years. A reorganization in 1949 established the five divisions into which the group is now divided: aerosols; disinfectant and sanitizers; insecticides; soaps, detergents and sanitary chemicals; waxes and floor finishes. At that time its present name was adopted to replace the old name, National Association of Insecticide and Disinfectant Manufacturers.

•

Warning on drums: Manufacturers of agricultural chemicals are being warned by the National Agricultural Chemical Association not to re-use or buy re-used drums which contained 2,4-D or 2,4,5-T for any other agricultural chemical. The great difficulty in breaking down these herbicides into products that won't harm crops makes this precaution necessary despite the current shortage of containers. Permanent warning markings on drums used for these products are being urged.

•

Spreading Cheer: Texas and Oklahoma have just been added to the markets in which Procter & Gamble's new all-purpose household detergent Cheer is being distributed. The product, first introduced in selected areas about a year ago, is being made in P&G's Dallas plant.

•

Seven-oz aerosol: Latest addition to Bridgeport Brass Co.'s line of Aer-a-sol insecticides is a 7-oz container, fair traded at $1.19. The company now has six sizes (3½-16 oz) in its insecticide line retailing at 79c-$3.95.

•

Pick-up slow-up: An inhibitor to prevent iron pick-up by shellac and other non-aqueous liquids has been developed by Monsanto Chemical Co. It is called Inhibitor 038, is a 40% alcohol solution of an organic phosphate that forms a complex iron phosphate coating on the container wall. Its use in small percentages (½-1%) enables shellac cutters to package products in 8-lb terne-coated containers. A minimum of 1% protects most commercial shellacs packaged in SCMT plate.

•

Synthetic wax: A new synthetic dark organic wax, designated as Wax S-1167, is now available in commercial quantities from Glyco Products Co., Brooklyn, N. Y. It forms an effective moisture barrier, and having good electrical properties, is being recommended for impregnating electrical components. Melting point (ring and ball) is 120-125C; flash point, above 250C. Other suggested uses are waterproofing and laminating paper, wood, textiles, etc., where the wax's dark color is inconsequential.

•

High-temperature paint: Fire-Gard is the trade name of a new series of paints capable of withstanding temperatures up to 1,900F. They are available from the producer, Fire-Gard, Inc., Washington, D. C., in a variety of colors including aluminum, black and white.

•

BHC-DDT blend: Pennsylvania Salt Manufacturing Co. has recently unveiled its process for blending DDT and benzene hexachloride with the diluent in making cotton insecticides so that virtually every particle of the finished dust contains some of the active ingredient. It is based on the fact that the two insecticides blended in the relative proportions commonly used for insecticide dusts have a lower melting point than either of the two melted separately. Insecticide dusts are usually the 3-5-0 (3% gamma isomer BHC, 5% DDT and the balance diluent) and 3-5-40 (same as 3-5-0 with 40% sulfur).

In the process, 36% gamma BHC is melted, and the correct proportion of DDT is added and melted with mild stirring. The molten mix, containing about 62½% BHC and 37½% DDT, will not solidify at room temperature for 72 hours.

An absorptive carrier is then impregnated by spraying the melt to make a 9% gamma BHC-15% DDT concentrate. This concentrate is then blended with twice its weight of non-absorbent extender for the 3-5-0, or sulfur and extender for 3-5-40.

•

New unit: Nox-Rust Chemical Corp. is starting to build another unit at its new plant in Stickney, Ill. It is not earmarked for any new products but will be used merely for expanded production of the company's present line.

NIACET
Trade-Mark
SODIUM ACETATE

is made especially for . . .

TANNING
For the removal of insoluble calcium salts during tanning to produce a tear-resistant, flexible leather. For neutralizing pickled skins in chrome tanning to give amazingly short tanning periods.

BUFFERING
Against strong acids, as in corn syrup refining.

RUBBER PROCESSING
As an acid absorbent in the manufacture of neoprene crepe. For activating rubber accelerators.

ELECTROPLATING
For improving the anode efficiency at low temperatures.

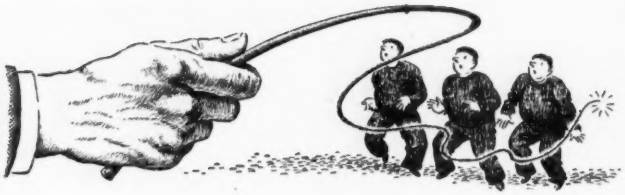
PHOTOGRAPHY
For dry fixers and hardening powders.

DYESTUFFS
For the preparation of diazo compounds in developing azo colors.

SYNTHESIS
Of coumarin, cinnamic acid, azo chloramide, benzyl acetate, and many others.

For further information write to:

Carbide and Carbon Chemicals Company
A Division of
Union Carbide and Carbon Corporation
UCC
922 Niagara Bldg. Niagara Falls, N.Y.



Hystrene* stearic acids give you the whip-hand over fatty acid ingredients

HYSTRENE stearic acids open new avenues to superior fatty acid products—soaps, esters, metal stearates—because these acids represent a completely different concept of stearic acid purity. Never before has stearic acid been available commercially at such high *true stearic content* or so completely free of unsaturates, unsaponifiables—undesirable elements that cause darkening at elevated temperatures.

What does this mean to your operation? Frankly, we don't know all the answers for all industries ourselves. But, our experiments *do* prove you can make lighter-colored, more stable esters than possible with ordinary commercial stearic acids. You can use HYSTRENE acid alone—or you can mix the exact stearic-palmitic-oleic mixture you desire, with confidence that your stearic portion is virtually free of trouble-making impurities. In this way, HYSTRENE acids offer you an original and fresh approach to improvements in temperature stability, color, odor, and shelf-life of your product.

There is no premium price on HYSTRENE stearic acids. Write for research samples.

HYSTRENE SPECIFICATIONS

	HYSTRENE T-70 (70% true stearic acid)	HYSTRENE S-97 (97% true stearic acid)
Titer (Average, °C.)	62	66.3
Iodine Value (Wijs)	0.5 Max.	0.8 Max.
Unsaponifiables (%)	0.15 Max.	0.25 Max.
Color (Lovibond, 5¼" Cell)	1½ Y-0.2R Max.	3 Y-0.3R Max.
Free Fatty Acid	101-102	100.0-100.5
Acid No. (Average)	200.2	197.3
Saponification No. (Average)	200.6	197.6
Max. Difference between Acid No. and Sap. No.	0.5	0.5

*HYSTRENE: Trade Mark of Trendex Co., Mfr.

ATLAS CHEMMUNIQUÉ

Polyol from Sun and Soil Helps Stabilize Supply

While prices and supplies fluctuate wildly for other types of polyhydric alcohol, the supply of *sorbitol*, made by Atlas from natural sugars, has climbed steadily in the last 15 years, and price has remained comparatively steady, with a general downward trend. A *primary* product, from *replaceable* resources, its promise is unlimited and manufacturing facilities are being doubled in 1951.

Which explains why many manufacturers of tobacco, glue products, resins, pharmaceuticals and foods are turning to sorbitol for a steady future supply of polyol for moisture-conditioning and synthesis.

New Methods for Testing Agricultural Emulsions

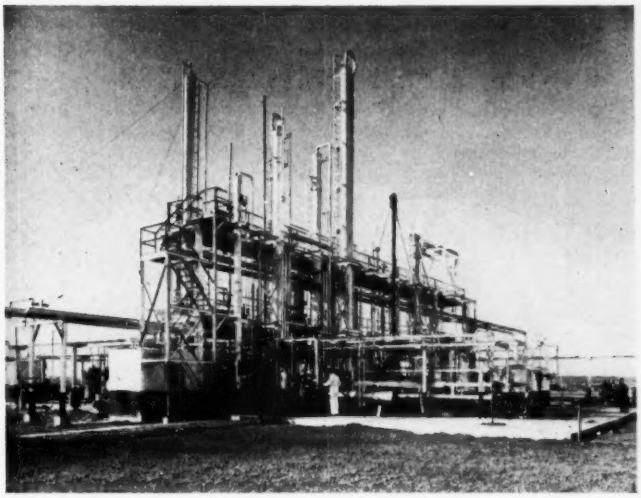
A new booklet published by Atlas shows a practical method for testing agricultural emulsions, gives detailed plans for an emulsion testing rack. Formulas for 39 insecticides and herbicides are included, showing how to select and use the complete line of Atlox* emulsifiers with 14 different toxicants. Write for "Atlox Surface Active Agents for Formulating Agricultural Chemicals."

*Reg. U. S. Pat. Off.

ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address*—Atpowco
ATLAS POWDER COMPANY, CANADA, LTD., Brantford, Canada



PILOT PLANTS: In transit.

Experts Probe Pilot Plants

Industry's dependence on costly pilot plants has been reduced by increased basic chemical engineering data plus use of higher mathematics. But in some operations these data only now provide a logical basis for pilot plant studies.

Another advance: Movement of analytical instruments to the control panel adds a new dimension to process control.

By far the greatest portion of industry's research dollar is spent on pilot plants—translation of test-tube experiments into the steel and concrete of industrial chemical processing units. Last week a sizable share of the nation's pilot plant experts—over 600—gathered at White Sulphur Springs, W. Va.,* to discuss their problems. Out of the welter of talk in the lobbies, dining room and West Virginia's pale version of the bar-room, several facts emerged:

1. There was a decided difference of opinion as to the exact function of a pilot plant. A careful course has to be plotted between each engineer's version of the precise definition for "pilot plant."

2. The rapidly increasing basic knowledge of various unit operations has enabled substitution of higher mathematics for pilot plants in many cases.

3. A pilot plant is no better than the analytical methods used to delineate the processes that are being carried out.

4. There has been a continued increase in the use of instrumentation, both in pilot plants and commercial units. Of more recent vintage is the movement of the analytical laboratory to the control panel, where the analyses are used directly in process control rather than as a check on product quality, as in the past.

Definition: The exact meaning of the term, pilot plant, was a major bone of contention. One group held that small-scale testing of a single unit operation, such as drying, centrifuging, etc., constitutes a pilot plant. Others, equally vocal, insisted that a pilot plant does not exist unless the unit operations constituting the process are being operated as an integral unit or plant.

In that both types of tests are part and parcel of the problem of getting a new plant into operation, both definitions are correct.

When: According to one process equipment manufacturer pilot plant studies are required only when the process development engineer is ignorant of some phenomena in the basic unit operations involved. A further comment: a pilot plant is impossible if the engineer is ignorant of too many of the phenomena.

Higher mathematics: The ultimate in plant design is the situation that faces the electronic engineer. According to Norbert Weiner at MIT the theory of electronics has reached such an advanced stage that it is now possible to carry out many "pilot plant studies" with pencil and paper, providing the experimenter has an adequate knowledge of higher mathematics. Recently perfected high-speed calculating machines are playing an increasingly important part in this development, for their use allows the researcher to employ many methods of computation formerly barred because of the huge amount of time required for their completion.

Chemical engineering theory is far from this ideal, but continued basic studies are bringing it ever closer.

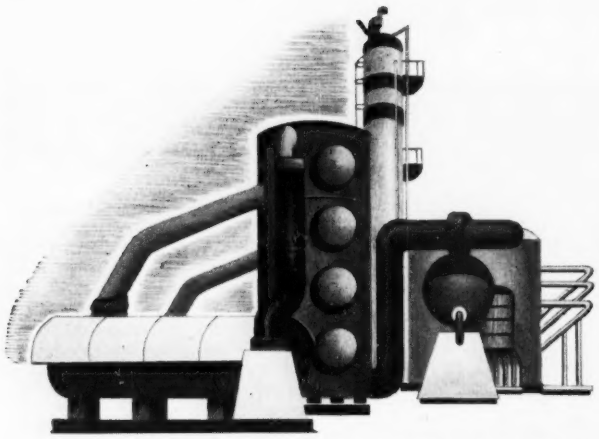
Analytical methods: Often the limiting factor in experimentation is the inability to provide analyses of the various mixtures produced. In many cases this statement should be amended to read "provide analyses fast enough." Thus, much of the initial experimentation is not on how to carry out the reaction or to separate the reaction mixture, but rather to determine just what is happening.

Instrumentation: In many cases instrumentation and analysis have become synonymous. In other words, the analytical laboratory has moved to the control panel. The mass spectrometer, an analytical tool, is now used in process control.

To accomplish the necessary analyses, the analyst is more and more becoming an electronics expert. Only by employing tools which give essentially an instantaneous response can the data necessary for plant and quality control be made available rapidly enough to prevent loss of huge quantities of off-specification product.

Forecast: A crystal ball is not needed to foresee redoubled efforts to reduce costly pilot plant research. For success, these efforts will rely primarily on an increased supply of basic research data. These data, when combined with the more efficient employment of higher mathematics and calculating machines plus faster analytical methods, will gradually transfer parts of the pilot plant from the laboratory to the engineer's office.

* American Institute of Chemical Engineers, March 11-14.



Chemical Plants

LOCATING IN THE LAND OF PLENTY*

FIND MANY NATURAL AND MAN-MADE ADVANTAGES FOR SUCCESSFUL PLANT OPERATION

An adequate supply of industrial water from wells, large and small streams, and tidewater bay and inlet.

Water

The world's finest supply of all-purpose Bituminous Coal, mined on the N. & W. and within short hauls of plants located in *The Land of Plenty.*

Coal

A good supply of skilled, semi-skilled and unskilled manpower — intelligent, adaptable and *home-rooted.*

Manpower

No extremes in weather, moisture or aridity. Well nigh perfect for your requirements.

Equable Weather

Let the Norfolk and Western tell you exactly what *The Land of Plenty* offers manufacturers of chemicals. There are many advantages for your important industry in this great and growing industrial region — and the N. & W.'s Industrial and Agricultural Department maintains a complete and up-to-the-minute file of information about economic plant sites in the area. This department has a half-century of experience in assisting manufacturers. *In short, they speak your language.* Their assistance is yours — PROMPTLY, RELIABLY, IN CONFIDENCE AND WITHOUT OBLIGATION. A letter, wire or telephone call will start them to work for you. Address: Industrial and Agricultural Dept., Drawer CI-405, Norfolk and Western Railway, Roanoke, Va.

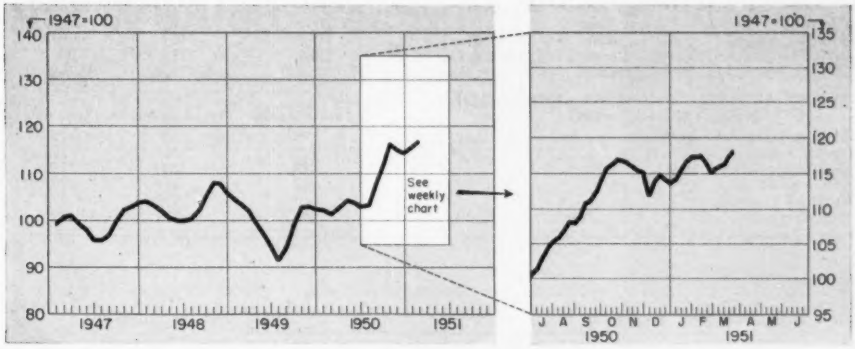
Norfolk and Western Railway

SERVING THE SIX GREAT STATES IN THE LAND OF PLENTY

*MARYLAND • VIRGINIA • WEST VIRGINIA
NORTH CAROLINA • OHIO • KENTUCKY

If you are interested in any particular mineral or group of minerals, the booklet, *Mineral Resources Along The Line of the Norfolk and Western*, is yours for the asking. We'll also be glad to send you our booklet in color, *Industrial Opportunities In The Land of Plenty*, if you'll drop us a line.

CHEMICAL MARKETS....



CHEMICAL INDUSTRIES OUTPUT INDEX—Basis: Total Man-Hours Worked in Selected Chemical Industries

Some traditional protective tariffs may fall, at least temporarily, during this period of mobilization. One recent instance is the two-year suspension of the 2¢ a lb. import levy on copper, provided the price does not drop below 24¢ a lb., delivered Connecticut.

Some DO allocations by the National Production Authority for chemicals and related products may be due for early readjustment. Producers of DDT are asking that mobilization requirements be revised downward for the next quarter to handle the peak seasonal demand.

From another sector of the chemical industry, dye manufacturers seek a definite maximum DO assignment in order to schedule their production more effectively in meeting military and civilian needs.

Stepped-up demand for adiponitrile and metal carburizing will push sodium cyanide to new production highs. One pleasing bit of news for these consuming industries is Du Pont's new $7.5 million plant now under construction at Memphis.

Trying to satisfy the simultaneous demands of U.S. industry and agriculture for sulfur and sulfuric acid is an unenviable task in the present supply drought. The problem is further complicated by claims from England and Canada for an additional 1% of U.S. production.

Look for early financial and technological encouragement of Italian sulfur production as one step in coping with the dilemma.

There is general agreement that thorny problems, when they get to the international level, tend to get somewhat thornier. In the International Materials Conference, the United States is employing various incentives to improve the flow of sulfur from Mexico, tin from Bolivia, and copper from Chile.

MARKET LETTER

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Industries Output Index (1947=100)	119.3	118.3	103.4
Bituminous Coal Production (Daily Average, 1000 Tons)	1,645.0	1,670.0	2,279.0
Steel Ingot Production (Thousand Tons)	2,069.0	2,021.0	1,843.0
Wholesale Prices—Chemicals and Allied Products (1926=100)	145.7	146.9	116.5
Stock Price Index of 14 Chemical Companies (Standard & Poor's Corp.)	220.4	213.2	168.3
Chemical Process Industries Construction Awards (Eng. News-Record)	$27,375,000	$2,719,000	$7,711,000

MONTHLY BUSINESS INDICATORS—PRODUCTION (Index 1935-1939=100)	Latest Month	Preceding Month	Year Ago
All Manufacturing and Mining	220	220	180
Durable Manufacturing	272	269	207
Non-Durable Manufacturing	199	200	180
All Chemicals	286	287	247
Industrial Chemicals	507	505	424
By-product Coke	178	176	127

For the first time since the summer of 1950, the wholesale chemical price index dipped last week. Essential oils constituted the only category showing an increase. This trend will continue in certain commodities if the Office of Price Stabilization rolls prices back at the manufacturers' level, permitting only those price advances corresponding to actual operating cost increases since Korea.

Ships passing each other in U. S.-Latin American commerce have been carrying caustic soda southward and glycerine northward. U. S. exports of solid caustic equalled 9.8 million lbs. for December, Argentina getting the lion's share of 5.1 million. U. S. imports of glycerine have tended to drop from last year because of keener bidding from Europe for South American supplies.

Here's more news about that perpetual headliner, benzene: More supplies from Western Germany may be forthcoming if a swap can be made replacing coal-tar benzene now going into motor fuel, with U. S.-made gasoline of equal quality.

On the U. S. scene, one large company in the Texas Gulf Coast area is reported to have paid between 45c and 68c a gallon for petroleum benzene at various times in the last six months.

Of far more than casual interest to the American chemical investor is the threatened expropriation of petroleum holdings in the Iran-Iraq area. Impetuous action of this sort could be a major blow to economic development of the entire Middle East, much of it promoted with U. S. funds and know-how.

SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending March 26, 1951

	Change	New Price		Change	New Price
UP					
Balsam, Tolu	$ .15	$ 6.15	Copra, cif. Pac./ton	$2.50	$272.50
Coconut Oil, crude, tanks, Pac. ports	.005	.21	Eucalyptus Oil, 80-85%	.05	1.50
DOWN					
Casein, domestic, over 5 tons	.02	.42	Shellac, bleached	.01	.58
Citronella oil, Ceylon, drums	.20	2.40	Spearmint Oil	.10	5.65
Cocoa Butter	.015	.77	Stearic Acid, triple pressed	.02	.265
Menthol, nat. USP	.25	12.80	Tallow fatty acid, dist.	.02	.205
Ouricury Wax, refined	.04	1.01	Tin oxide, bbls.	.05	1.34
Red Oil, single dist., tanks	.015	.24			

All prices per lb. unless quantity is stated

Help Wanted: Technical

Manufacturing Chemists Association reports: 21.6% of industry's scientists and engineers are reservists, subject to recall.

Industry needs, immediately, 7.4% more technical help, need will rise to 15% by July when mothball plants resume operations.

Washington agencies appoint manpower administrators, but there is no coordination of activities, each is vying for power.

Everyone in Washington agrees that a clarification of the current manpower picture is imminent; many expect it within the next few weeks. Among chemical men the big hope is that any new policy directive will shed some light on the confusing situation with regard to scientists and technical men.

The plain and simple truth is that there is not enough technical help available for industry. Furthermore the recent report of the committee appointed by the Manufacturing Chemists Association showed that 21.6% of industry's scientists and engineers are in the Army, Navy, and Air Force Reserves . . . and are subject to recall under present policies.

. The shortage is going to get worse in the summer, when the numerous mothball plants resume operations. The committee points out a need for 7.4% of technical men immediately, and estimates that this will rise to 15% by July.

The committee reinforces findings and recommendations made by the Thomas Committee earlier this year. That report would place a high deferment priority on technical people. It calls on the Department of Defense to issue policies by which the call-up of reserves could be reconciled with industry's vital need for scientific manpower. A top-level board to act on appeals from "call-ups" would be established under another recommendation made by the Thomas Committee.

Atomic Energy Commissioner Henry DeWolf Smyth recognizes the acute shortage and offers a partial solution. He feels that some of the technically trained could be diverted from less essential work to defense production. He suggests, for example, that "some of the chemists from the cosmetics industry and most of the physicists from the television industry could be used in ways that would be more likely to insure the survival of this republic."

Smyth's suggestion seems practical but unquestionably would arouse a furor in the industries called upon to give up some of their trained scientists.

Another solution would be to draft 18 year olds. That would give the armed forces an additional million men to pick from, although only about half of them would be deferred because they are still in high school or because of physical condition.

Guide to deferment: At present the only guide to deferment of potential draftees, reservists, or guardsmen is a list of 59 critical occupations. Chemists, engineers, pharmacologists, and metallurgists are listed but conspicuously absent is mention of specific "supervisory" occupations of any kind.

The list does nothing toward clearing up the confusion. Apparently the extent to which draft boards and other agencies use it as a "guide" varies greatly. Another list to be issued shortly by the Labor and Commerce Departments is reported to be a mere tightening up of the original.

Solution: The first step in straightening out the confusion would be the appointment of one man or agency to coordinate the activities of the existing groups.

At present every agency in Washington which can justify a manpower administrator, has one. And each one is vying for power. Under normal conditions, the Secretary of Labor would have undisputed authority, but these are not normal times.

Many think Defense Mobilizer Wilson is a likely candidate to run the show. Wilson recently appointed Arthur Fleming as his special assistant in charge of manpower. Fleming will head a seven-man committee composed of top ranking representatives from Defense, Agriculture, Selective Service, U.S. Civil Service, Defense Production Administration, Labor, and the Wage Stabilization Board.

ARTHUR FLEMING: May answer the question—industry or infantry.

Secretary of Labor Tobin has also appointed a new manpower administrator—Dr. Frank P. Graham. Graham's job will be to coordinate all defense activities of the Department of Labor, and will report directly to Tobin. In appointing Graham, Tobin revealed he had ordered the name of the Office of Defense Manpower changed to read Office of the Defense Manpower Administration.

Each contestant is aware of the necessity of gaining the confidence and cooperation of the labor unions. For instance, Albert J. Hayes, president of the International Association of Machinists was recently appointed special assistant on manpower to Mrs. Anna Rosenberg (Assistant Secretary of Defense on manpower and personnel).

But Hayes is playing on several teams. He's a member of The Advisory Committee on Defense Manpower (Tobin) and a member of the Advisory Committee to the Director of the Defense Mobilization Board (Wilson).

As yet, no authority has been given to any of the administrators to deal with the overall aspects of the question. Specific authority in certain fields has been given to individual agencies.

In any event, the person who gets the job of coordinating the various manpower agencies has his work cut out for him. He will have to answer a lot of questions and his decisions will result in many injured feelings.

The ray of hope for chemical companies is that the situation is bound to improve for a very fundamental reason . . . it can't get any worse.

DEMPSTER DUMPSTER SYSTEM

SERVING COST-MINDED MANAGEMENT FROM COAST TO COAST

. . . handling bulk materials of every description at phenomenal savings

The large photo shows a Universal type Container being transported at the Celanese "Celriver" plant, while two small photos show how a special 10 cu. yd. container is lowered and placed in loading position under bin. Dempster-Dumpster then moves on to service another container. Both type containers have drop bottom dumping action, and are emptied automatically from hydraulic controls in truck cab.

*Reg. U. S. Pat. Off.

Celanese* – recognized across the nation

- TEXTILES
- PLASTICS
- CHEMICALS

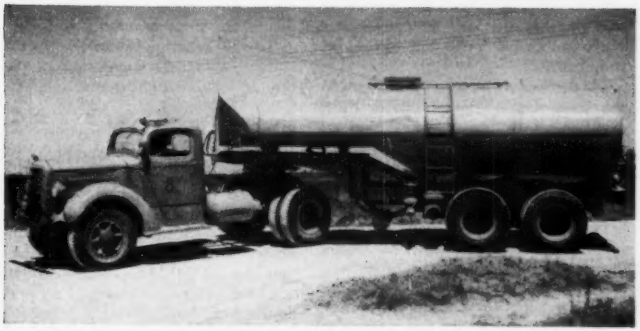
. . . Celanese Corporation of America, well known for sound management, uses the Dempster-Dumpster System at its "Celriver", Rock Hill, S. C. yarn plant

Celanese Corporation of America is among the hundreds of well managed manufacturers, both large and small, who use the Dempster-Dumpster System of bulk materials handling . . . the system recognized across the nation for its efficiency and ability to reduce costs.

This system consists, basically, of one Dempster-Dumpster and any number of detachable Dempster-Dumpster Containers, which are spotted at convenient materials accumulation points inside and outside plants. With only one man, the driver, the Dempster-Dumpster picks up, hauls and dumps (or sets load down intact) one pre-loaded container after another. The capacities of the larger Dempster-Dumpster Containers are equal to and greater than regular dump truck bodies, and they are available in a wide variety of designs each suited to the type of materials handled—be they bulky, light or heavy . . . solids, liquids or dust . . . trash or rubbish. In some installations one Dempster-Dumpster handles as many as 100 or more containers—increasing man-power efficiency . . . reducing investment and maintenance costs . . . improving "housekeeping" methods . . . reducing fire hazards . . . and providing an easier, quicker, safer and more efficient manner of handling materials. It will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers. . . All Designs. . . All Sizes

DEMPSTER BROTHERS, 241 Dempster Building, Knoxville 17, Tennessee



TANK TRUCK delivery of brine to plant helps Texas chemical industry.

Salt On Wheels

A new type of service to industrial operations has been started in the Southwest . . . the plant gate truck delivery of salt. The Texas Brine Corporation at Houston is supplying its customers with salt, either in the form of crushed rock or brine, in whichever form is more suitable to the needs of the customer.

So far, paper mills, synthetic rubber plants, electrolytic chlorine and water softening plants are the principal customers for the brine. But operators of ice and refrigeration plants are also becoming interested in the new service. Another important user is the petroleum industry which uses it in the reworking of oil wells. Delivery of the brine to the oil rig is made in tank trucks . . . a new feature for the old petroleum industry.

The new service covers a radius of 250 miles from Houston and deliveries are made around the clock. Orders can be delivered within an hour after receipt, provided the calls are within the Houston area.

Cost: The cost of the material to the consumers is based upon the salt content. But they get their salt for the same price regardless of whether it is in the form of crushed salt rock or brine.

Source: The Texas Brine Company and its affiliate, United Salt Company, have salt domes at Pierce Junction, five miles south of Houston and at Hockley, 35 miles northwest of the city. The Pierce Junction dome is used to supply brine and the Hockley dome, crushed rock salt.

The brine is produced by pumping water down into the salt dome at a point 3,000 feet below the surface of the earth. The salt in the dome has a purity of 98.6 percent to 99.3 percent; residual impurity being mainly calcium sulfate.

On wheels: Saturated brine is delivered by a fleet of tank trailer trucks. Each truck has a capacity of 2 to 4 thousand gallons of brine which is the equivalent of about 5.3 to 10.6 thousand pounds of salt.

As rock: To those customers who want their salt in the hard form, delivery is made by the use of trailer trucks especially designed for the purpose. Each truck is equipped with a dissolving unit so that brine can be made at the customer's site. The dissolver, known as a portable brine maker, uses the customer's water supply to empty the truck of its working load of 18 tons of salt in about three and a half hours.

It seems a good bet that as the salt based chemical industry continues to grow in the Southwest, more and more of its raw material will be "hitting the road."

Ready Rayon

This week, the high cost of wool continues to cause many carpet manufacturers to consider turning to chemical fibers as a means of protecting their future (CIW, January 20, 1951). And the recent purchase by the Bigelow-Sanford Carpet Company of a controlling interest in the Hartford Rayon Corporation is being studied by many of them as one type of solution to their raw material dilemma.

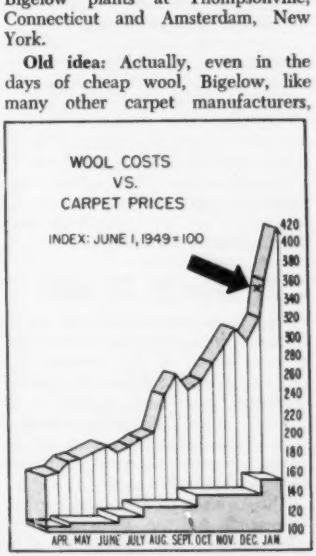
Hartford Rayon, located at Rocky Hill, Connecticut, manufactures heavy denier rayon filament. Its purchase by Bigelow, traditionally a 100% wool user, represents a major departure by the carpet company and a step into an entirely new phase of carpet manufacture. In a broader sense it is another example of the trend in which some consumer product companies are strengthening their competitive position by buying into chemical process companies that supply their raw materials.

Production plans: Old customers will continue to be supplied by Hartford Rayon. Present filament yarn operations wil not be converted to Rayon staple for carpets. But Bigelow's current plans for Hartford call for an expansion of production from the present 5 million to about 8 million pounds of rayon staple a year. The idea is to expand Hartford's present facilities so that its filament production may be supplemented with the manufacture of rayon suitable for carpet manufacture.

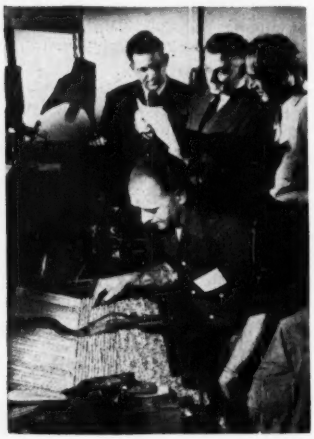
Says James D. Wise, president of Bigelow: "Such additional operations at Hartford's plant, however, are not expected to meet Bigelow's expanding needs for rayon suitable for carpets. Bigelow plans to continue the purchase of carpet rayon from other sources in order to meet its requirements."

The plan to buy into Hartford Rayon (39% of common stock, 38% of oustanding preferred stock) was not the result of any crisis-type management decision. Bigelow's research staff has been experimenting for many years with the weaving of hundreds of carpet types containing a wide assortment of chemically processed fibers. The Bigelow choice of Hartford Rayon as a buy was dictated by that company's proximity to the Bigelow plants at Thompsonville, Connecticut and Amsterdam, New York.

Old idea: Actually, even in the days of cheap wool, Bigelow, like many other carpet manufacturers,



"X" MARKS THE SPOT in 1950 wool climb where Bigelow bought into rayon.



BIGELOW explores, evaluates, employs rayon-wool mixtures for carpets.

had nursed a desire to make carpets out of a more "constant" material than wool. They longed for a fiber that would have stable and predictable manufacturing and dyeing characteristics . . . and one whose supply and price could be assured.

Based on their research Bigelow feels that rayon-wool mixtures may prove to be the answer. A carpet containing a blend of 50% wool and 50% rayon can be sold for $2 less per square yard than a similar all wool carpet. But Bigelow stresses the point that carpet rayon must be heavier and more delustered than the rayon used in the manufacture of apparel.

The carpet company is sufficiently convinced of the utility of rayon in carpet manufacture to schedule 27% of their production this spring as rayon carpets. This percentage will be revised upwards as additional carpet rayon materials become available.

As the output of the spineret continues to increase the outlook for the sheep as a source of carpet materials becomes more limited.

On Deck: M-45

This week, the skeleton of an all inclusive chemical control order (M-45) was issued by the National Production Administration. No specific chemicals have been posted in its schedule as yet. But insiders believe that sulfur and sulfuric acid will be among the first chemical staples to come under M-45's sway.

Three levels: The new order's framework sets up three levels of allocation by which chemicals will be handled, depending upon their scarcity and essentiality. For the most critical chemicals, both the purchaser and the supplier will have to secure NPA authority to fill any order for the chemical.

In the case of chemicals regarded the least scarce, the purchaser must certify to the supplier how the chemical will be used. The supplier in turn must apply for an NPA allocation.

In-between: The third level of control is in an intermediate category between the other two. The purchase of small quantities of materials falling under this provision of the order will require that the purchaser certify the use to a supplier who in turn must apply to the NPA. In this sense the third level of control is similar to the procedure followed for the least scarce chemicals.

On large purchases of chemicals falling under the third level of control, however, both the purchaser and the supplier must apply to the NPA directly.

DO ratings: Spokesmen for the NPA revealed that DO rated orders for a particular chemical will be superceded when that chemical is placed under control. Do rated orders for chemical maintenance, repair and operating supplies (MRO) will also be superseded by M-45.

FOREIGN . . . . .

England: British Aluminum Co., Ltd. describes as "utterly without foundation" reports that the company plans a $33 million project for bauxite reduction in British North Borneo. The report, which originated in Singapore had gained widespread acceptance.

However, the company, in a joint undertaking with Alcan, is studying the possibility of such a plan at at least three sites. Besides the North Borneo location, one likely site would be the Gold Coast. But the sites are still being studied, and as yet no decision has been made to go ahead with the construction, anywhere.

•

Brazil: Once world's sole source of rubber Brazil now finds itself in a strange position. The country has embarked on a program which it hopes will assure enough rubber to satisfy home needs and eliminate the necessity of importing it from southeast Asia.

The fault is not all the rubber growers'. In the last ten years, the country's rubber goods industries (notably tire producers) have been responsible for a tenfold increase in domestic requirements.

This year, needs will exceed 38,000 metric tons, production 29,000. License and exchange to import the deficit has been granted.

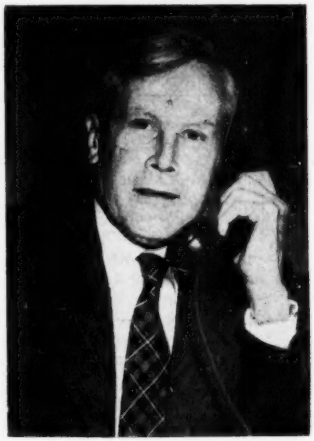
The Ministry of Finance is opening studies aimed at increasing production and stabilizing price at fair level.

EXPANSION . . . .

Phillips Petroleum: Company will undertake a major expansion of its Woods Cross refinery, just north of Salt Lake City, Utah. W. W. Keeler, vice president in charge of refining, reports that plans call for construction of a 10,000 bbl. per day catalytic cracking unit. Although no cost figures have been given, it is believed the cracker, plus tankage and equipment, will entail an expenditure of approximately $10 million.

PEOPLE . . . . . .

Karl D. Kein, formerly training coordinator for Monsanto's John F. Queeny plant in St. Louis is now industrial relations director of company's plant in Anniston, Ala.

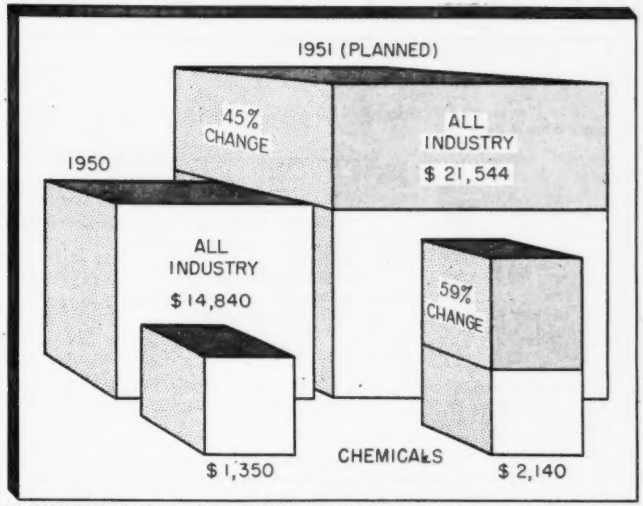


Dr. Alan T. Waterman will be the first director of the National Science Foundation. Waterman, presently technical director of the Office of Naval Research, was appointed by President Truman, will assume his new duties as soon as the Senate confirms the choice.

The National Science Foundation was created by law late last year to coordinate basic research inside and outside of government. Its scope will include all phases of scientific research, aside from atomic energy.

PICTURES IN THIS ISSUE:

17—Cameo Curtains, Inc.; 23—Harris & Ewing; 20—R. D. Sheeline; 27—U.S. Dept. of Agriculture; 30-31—The Kennedy Studio; 35—Celanese Corp.



EXPANSION PLANS (1951 VS. 1950): For the chemical industry, 59% more money on expansion programs; for all industry, 45%.

Inside On the Future

Chemical companies plan to spend $2.14 billion in expansion programs in 1951, will raise capacity 11%.

Principal source of funds (91%) will be depreciation reserves and profits; only 3% will come from new stock.

Survey by McGraw-Hill economics department shows what industry plans for '51, is not a forecast.

The "just-out" annual survey by the McGraw-Hill economics department indicates that industry will spend more money on expansion programs ($21.5 billion) than ever before. And once again the chemical companies will outstrip all other classifications in dollar-outlay with a planned expenditure of $2.14 billion.

A comparison of figures actually spent on new facilities in 1950 with planned expenditure in 1951 dramatically underlines the effect of the outbreak in Korea on our national economy. The chemical industry will spend 59% more than it did in 1950; all manufacturing industry, including the chemical, 66%; all industry, 45%.

One fact that must be considered in weighing the money planned for expansion: the money is expressed in terms of an inflated dollar. However, even an allowance for a 10% increase in the cost of capital goods (over 1950) shows a substantial increase for 1951.

Another barometer: The survey's index of physical capacity is another good indication of how industry is preparing to meet the challenge of a butter-or-guns-or-both economy. The chemical industry will boost capacity 11%; this will put them well above the average increase for all industry 9%. The results of the survey shown in the table provide the only direct measurement of expansion in the American industry since before World War II.

Emphasis shifts: In 1950, modernization and replacement of existing facilities get the first call on the investor's dollar—only 43% of total investments went toward expansion programs. But this year the pendulum will swing the other way: 58% will go for new facilities.

The chemical industry has always allotted an appreciable amount of the total investment for new construction and new equipment. This year, in step with the general trend of all industry, it will increase its allocation of new capital for expansion. About 80% will be used for that purpose.

Sources of financing: In sharp contrast to the general policy during World War II, industry will finance the bulk of its new facilities from "inside" money. For all manufacturing industry, 86% of all investment funds will come from money gained through depreciation and retained profits. Only the aircraft industry will rely to any extent on government or government guaranteed loans.

As in previous years, the chemical industry hesitates using "outside" money, prefers "inside" sources. A breakdown of the sources of financing chemical expansion plans reveals: 91% will come from depreciation and retained profits, 3% will come from sale of stock and remaining funds will come from diversified sources. An interesting fact in the survey is that chemical firms are not relying on increasing their debt through either private or government sources.

Questions: The survey is not a forecast; it is a factual report of what industry would like to do in the coming year. And it poses many interesting questions.

For instance, about half of the business leaders surveyed expressed the belief that increased defense orders would force an upward revision of their expansion plans for the year. Actually, they are attempting to build facilities to meet both military needs and the high level of civilian demands. They are also continuing an effort to modernize present plant equipment.

But all plans will be reviewed by government agencies charged with the allocation of critical materials. And a Controlled Materials Plan would give Washington the final say on who-builds-what. At any event, with less steel available for civilian use, it is clear that not every firm can buy all the equipment it wants. Some programs will just have to give way to others.

INDEX OF PHYSICAL CAPACITY (1939=100)

	Jan. 1946	Dec. 1948	Dec. 1949	Dec. 1950	Planned for 1951	Capacity Increase 1950-51
CHEMICALS	172	250	264	293	325	11%
Autos	104	130	140	153	179	17
Food	117	135	138	143	152	6
Petroleum refining	123	160	171	178	183	3
Machinery	154	200	216	236	260	10
Steel	112	115	121	126	139	10
Electrical machinery	175	280	301	325	371	14
All manufacturing	131	156	164	175	191	9

INDUSTRIAL AROMATICS
DEODORANTS
GERMICIDES
FUNGICIDES
PRESERVATIVES
ANTI-SKINNING AGENTS

for
TEXTILES
PAINTS—ADHESIVES
PAPER—PLASTICS
SOLVENTS—RUBBER
and other chemical industries

SINDAR *Corporation*
Industrial Aromatics and Chemicals
330 West 42nd Street
New York 18, N. Y.

Government Needs

Navy Purchasing Office, 111 E. 16 St., N.Y., will receive bids on the following chemical items:

UNTIL:	INVITATION NO.	QUANTITY AND ITEM
Apr. 6	8552	16,500 lbs. hydrofluoric acid
" 10	8590	2,860 lbs. potassium cyanide
" 10	8566	150,000 lbs. sodium metasilicate pentahydrate
" 11	8573	4,700 ea. automobile polish
" 12	8587	13,000 ea. furniture polish
" 12	8516	various—duplicating ink
" 13	8554	90,000 lbs. calcium chloride
" 16	8576	2,700 lbs. mercury
" 17	8581	2,000 gal. methanol
" 19	8546	various—ethyl alcohol

Purchasing Officer, Bureau of Engraving and Printing, 14th & C Streets, S.W., Washington 25, D.C., will receive bids until May 8, 1951 on the following:

2,000 lbs. carbon black
30,000 lbs. precipitated black iron oxide
7,000 lbs. methyl violet toner
60,000 lbs. iron blue red tone
12,000 lbs. iron blue green tone
1,000 lbs. victoria blue toner
30,000 lbs. chrome yellow light
5,000 lbs. lithol rubine toner
13,000 lbs. titanium dioxide
2,500 lbs. red toner
1,200,000 lbs. barytes
160,000 lbs. plate paste drier
8,000 lbs. aluminum hydrate
18,000 lbs. calcium carbonate
240,000 lbs. barytes (BEP-379)

Government Contract Awards

COMPOUND:	TO:
synthetic enamel thinner	George Senn, Inc. Western Associates, Inc.
medium grey enamel	Lilly Paint Products, Inc.
synthetic gloss enamel	Alsamite Paint & Varnish Co.
turpentine	George Senn, Inc.
clear lacquer thinner	Western Solvents & Oils
type V, grade A dessicant	Davison Chemical Co.
protective compound (strippable, hot dipping) type 11	Seal Strip, Inc.
insecticide (DDT, Aerosol)	Revlon Products Corp. Puritan Distrib. Co. Eston Chemicals, Inc.
disinfectant	Fine Organics, Inc.
thiamine hydrochloride	Winthrop-Stearns, Inc.
chemical heat pad and refills	Ross-Harry Co.
di (2-ethylhexyl) sebacate	Rohm & Haas Co.
ethyl centralite, flake	Sharples Chemicals, Inc.
plastic inhibitors	National Plastic Prod. Co.
fire retardant paint	Sillers Paint & Varnish Co.

Send For This Valuable Mailing List Data!

To aid you in planning your direct mail, check any of these mailing lists you may be interested in . . .

- ☐ Business Executives
- ☐ Electrical Appliance Dealers
- ☐ Manufacturing Industries
- ☐ Metal-Working Industries
- ☐ Aviation Industries
- ☐ Bus Industry
- ☐ Chemical Processing Industries
- ☐ Civil Engineering and Construction Industries
- ☐ Coal Mining Industries
- ☐ Electrical Industries
- ☐ Electronic Engineers
- ☐ Food Industries
- ☐ Metal Mining Industries
- ☐ Power Plant Engineers
- ☐ Product Design Engineers
- ☐ Textile Industries
- ☐ Welding Industry

. . . attach this 'ad' to your business letterhead . . . and mail. We'll send you complete information, selections, list counts, and prices. No obligation, of course.

Direct Mail Division

McGRAW-HILL Publishing Company
330 W. 42nd St., New York 18

BOOKS . . . . . .

The Behavior of Engineering Metals, by H. W. Gillett. John Wiley & Sons, Inc., New York, N. Y.; 395 pp., $6.50.

From the viewpoint of the metallurgist, the author explains the factors to be considered in selecting the proper metal or alloy for a given use. The book is intended, however, primarily for the non-specialist in the field; therefore, the behavior of engineering materials is covered rather than the theories that explain the behavior. The use of technical terms is kept at a minimum.

The volume presents the basic concepts, their origin, and relationship to each other in the first six chapters. The bulk of the text is devoted to a discussion of the behavior of each of the principal commercial metals and alloys, with the greater part of space being allocated to those materials of the highest commercial importance. The author describes the fitness of certain metals for specific uses, the amenability of the metal to being handled in a certain way, the interpretation of conventional tests, and special considerations influencing the selection of metals and alloys. The last chapter deals with cost and availability factors.

Methods of Vitamin Assay, edited by The Association of Vitamin Chemists, Inc. Interscience Publishers, Inc., New York, N. Y.; xviii+301 pp., $5.50.

Like its predecessor, this second edition discusses the methods of vitamin assay that have been acquired as the result of the pooling and interchange of information on analytical technics. Stress is placed on those details of procedure which determine the usefulness and precision of a method; and the procedures themselves are those which will assure optimal results under the most divergent conditions of laboratory practice. Intended for the analyst, this edition provides a basis for selecting a procedure suitable to his specific work. Along this line, there is a discussion on the relative merits of various published methods and their applicability to different types of samples.

Pharmaceutical Emulsions and Emulsifying Agents, by L. M. Spalton. Chemical Publishing Co., Inc., Brooklyn, N. Y.; 132 pp., $3.75.

Using a practical approach, this book presents and clarifies essential details relating to the large number of emulsifying agents now available for use in pharmacy. Chapter I gives a brief and somewhat simplified discussion of the theory of emulsification and the structure of emulsions. After classifying the pharmaceutical emulsifying agents as anionic, cationic, and nonionic and also according to their sources, the author explains the technique of emulsification, the apparatus used, and the possible causes of failure. He goes on to discuss the uses and limitations of the various emulsifying agents as used in special pharmaceutical applications. Practical notes on compounding and representative formulas are included.

The book contains a classified index of emulsifying agents and other substances employed in pharmaceutical emulsions in addition to brief details on the composition and uses of these products.

Flow Measurement with Orifice Meters, by R. F. Stearns, R. R. Johnson, R. M. Jackson, C. A. Larson. D. Van Nostrand Co., Inc., New York, N. Y.; xviii+350 pp., $7.50.

One of the "Esso Series", this book has as its purpose the furnishing of all information required for the effective use of fixed-area orifice meters in common refinery applications in one reference source. Although the authors present principles and basic practices which are general in nature, they review only those procedures which exemplify methods currently used in refinery operations. Physical data, also is limited for the most part to fluids found in petroleum refining. The authors restrict their information on flow meters to installations in closed conduits, using flat plate, square-edged orifices for the measurement of compressible and incompressible fluids. Data is given on testing and checking meters, interpretation of meter records, and special metering problems. This book will be of value to those groups concerned with process control, test work, and plant start-ups—such as engineering, technical service and instrument divisions.

Briefly Listed

COPPER IN CALIFORNIA, BULLETIN 144, 429-p., publication with accompanying pocket of 52 maps presents the history, geology, economics and future of the California copper occurrences, based upon strategical mineral investigations sponsored by the United States Geological Survey and the Bureau of Mines. Available from the California Division of Mines, Ferry Bldg., San Francisco, Calif. for $6; separate pocket of maps for $1.

Just Published

THE CHEMISTRY AND ACTION OF INSECTICIDES

1. Treats insecticides, their chemical and physical properties, and their effects upon insects, plants, and higher life, including man. Covers a wide variety of insecticides—the arsenicals, sulphur and its compounds, the alkaloids, etc.—arranging them in terms of their chemical properties. Considers characteristics of dusts and sprays, formulation of mixtures and compounds, etc. **By Harold H. Shepard, Insecticide Division, Livestock Division, U.S. Dept. of Agriculture. 504 pages, 22 illus., $7.00**

Just Published

TOXOLOGY OF URANIUM

2. Presents reports of studies on the toxology of uranium compounds, the biochemical effects of uranium poisoning, the mechanism of action of uranium, and the transport of uranium to the tissues. Shows the distribution, accumulation, and excretion of uranium following oral and parenteral administration . . . the comparative toxicity of uranium to the intact animal, etc. **Division IV, Volume 23 in the National Nuclear Energy Series. Edited by Albert Tannebaum, Dir., Dept. of Cancer Research, Medical Research Inst., Michael Reese Hospital, Chicago. 334 pages, illustrated, $3.00**

Just Published

ECONOMICS OF FUEL GAS FROM COAL

3. Takes up both the economic and technical factors concerned in the production of fuel gas from coal, together with comparative cost data on other fuels, such as natural gas. Answers your questions on the possibilities of manufacturing fuel gas from coal at a cost permitting its substitution for other fuels. Presents data on operating costs, maintenance, investment costs of equipment, and current research. **By Battelle Memorial Inst. for Bituminous Coal Research, Inc. John F. Foster and Richard J. Lund, Editors. 289 pages, 65 illus., 39 tables, $3.00**

PROCESS HEAT TRANSFER

4. Provides practical instructions in the calculations, derivations, and empirics of heat transfer—using the language and method of industry. Combining theory with engineering "know-how", the book integrates the related aspects of the larger processes to show the interdependence of the various parts of heat transfer requirements. Presents a large amount of original methods and data . . . contains the recent developments in heat transfer in fluid and fixed bed catalytic processes, regenerative heat transfer systems, etc. **By Donald Q. Kern, Dir., Process Eng'ring Div., The Patterson Foundry and Machine Co. 846 pages, 350 illus., $8.00**

SEE THESE BOOKS 10 DAYS FREE

McGRAW-HILL

McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18

Send me book(s) corresponding to numbers encircled below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep, plus few cents for delivery, and return unwanted book(s) postpaid. (We pay for delivery if you remit with this coupon; same return privilege.)

1 2 3 4

Name .....

Address .....

City ..... Zone..... State .....

Company .....

Position CN-3-31-51

This offer applies to U. S. only.

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • **OPPORTUNITIES** • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

$1.20 a line, minimum 4 lines.
To figure advance payment count 5 average words as a line.

EMPLOYMENT WANTED and Individual Selling Opportunity undisplayed rate is one-half of above rate, payable in advance.

PROPOSALS, $1.20 a line an insertion.

INFORMATION

BOX NUMBERS count as one additional line in undisplayed ads.

EQUIPMENT WANTED or FOR SALE Advertisements acceptable only in Displayed Style.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE:

The advertising rate is $9.75 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request. AN ADVERTISING INCH is measured 7/8 inch vertically on one column, 3 columns—30 inches —to a page C. I.

NEW ADVERTISEMENTS received by 10 A. M. April 4th at the New York Office, 330 W. 42nd St., New York 18, N. Y., will appear in the April 14th issue subject to limitations of space available.

F M C EQUIPMENT HEADLINERS

Selected from our Latest Bulletin

Swenson Steel Quadruple Effect Long Tube Vertical Evaporator with all accessories

Welded Steel Autoclave 4' x 25' Horizontal; cast steel heads; 150# pressure; ½" plate

Louisville Counter Current Dryer; monel lined; 38" x 16'

Steam Operated Shelf Dryer; 6' x 6' x 6' with Blower 2 Stokes Vacuum Ovens; inside 53" x 50" x 61" outside dimensions; 72" x 72" x 41½"

Pfaudler Glass Lined Extraction Distillation Unit with Pyrex interconnecting piping; print available 500 Gal. Stainless Steel Jacketed Reactor; 6' diameter

Four Pfaudler 1500 Gal. Glass Lined Jacketed dished head Tanks; 53" x 68"

Send Us Your List of Surplus Equipment

FIRST MACHINERY CORP.
157 Hudson Street,
New York 13, N. Y.

SELLING? BUYING?

Call
"CONSOLIDATED"
USED MACHINERY FOR THE CHEMICAL & PROCESS INDUSTRIES

Including Paint, Food, Rubber, Plastics, Sugar, Drugs, Cosmetics and Allied fields. Single items to complete plants.

CASH FOR YOUR IDLE EQUIPMENT

CONSOLIDATED PRODUCTS CO., INC.
14-18 Park Row, New York 38, N. Y.
BArclay 7-0600

WANTED

WANTED
Kent Ring Roll Mill

To grind Florida Pebble Rock Phosphate, capacity 5 to 6 tons per hour, fineness 80 mesh or better, complete with air separator. Send full particulars to Green Valley Fertilizer & Chemical Co., Ltd., P.O. Box 140, New Westminster, B. C., Canada.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

BUSINESS OPPORTUNITY

PARTY WISHES to purchase formulas and manufacturing process for Putys, Caul King Compund, Metal Drawing Compund and Spray Booth Coatings. Proven products wanted. If interested write care of BO 9216, Chemical Industries.

J *"Geared to Serve You"*
1000 lb. mixer & sifter—with bucket elevator. 280 gal. Baker Perkins jack. mixer—complete.
20" x 20' S. S. bubble cap column.

ASPER MACHINERY CO. INC.
1123 BROADWAY 10, NEW YORK
CHelsea 3-9010 9011

FOR SALE

4 Selectro Vibrating Screens, 2'x7', two deck, enclosed, stainless steel.
2 Mikro Pulverizers, #1-SI, #2-SI
1 Hardinge Conical Ball Mill, steel liner, 4'6" dia. x 24".
10 Stainless Steel Tanks, Type 316, closed, 50, 80 and 325 gal.
1 Rotary Vacuum Filter 8' x 8' Acid Proof, Rubber & Lead.

PERRY EQUIPMENT CORP.
1521 W. Thompson St.
Phila. 21, Penna.

IF THERE IS

Anything you want

that other readers of this paper can supply

OR—

Something you don't want

that other readers can use, advertise it in the

Searchlight Section

Professional Directory

A GUIDE TO CHEMICAL, CHEMICAL ENGINEERING, MARKETING, AND LABORATORY SERVICES

FOSTER D. SNELL INC.

PRODUCT DEVELOPMENT AND EVALUATION.

Physical Testing — Bacteriology, Clinical Studies — Market Research, Surface Activity and Detergency
Write For Booklet No. 11

Chemists — Engineers

29 W. 15 St. New York 11, N.Y. WA 4-8800

CHEMICAL CONSULTATION, RESEARCH, DEVELOPMENT

THE PANRAY CORP.
Research Division
340 CANAL ST., NEW YORK 13

- Product and Process Development
- Sponsored Industrial Research
- Custom Organic Syntheses
- Chlorination Processes
- Chemotherapeutics
- Microanalyses

Phone: WAlker 5-7990

EVANS
RESEARCH AND DEVELOPMENT CORP.
Chemical Research ▶ Processes ▶ Products Development Problems
Complete Laboratory ▶ Pilot Plant ▶ Mechanical and Optical Sections
Ask for NEW Scope Sheet C listing over 100 of our activities.
250 East 43rd Street, New York 17, N. Y.

When you need a SPECIALIST in a hurry . . .

Chemical Industries Week Professional Directory offers the quickest, most direct method of contacting consultants who may be available NOW.

READER SERVICE . . . . . .

HOW TO USE COUPON

Mail the coupon at the bottom of page. Circle page numbers of items about which you want more details. Then write your name and address and mail it to us. Your request will be forwarded to companies concerned, the answer coming direct to you.

MAKES IT HANDY

Products and literature in this issue are listed on these pages. There are three indexes. (1) Editorial items on new products, new equipment, new literature; (2) products advertised. (3) The index of advertisers is on the following page.

THE NUMBERS

Advertisements:—There is a page number on the coupon for each advertisement. Before the number, may appear, L, R. T. B (left, right, top, bottom), locating the ad on the page; small letters following (a,b,c) indicate additional products in the advertisement.

Editorial Items:—Numerals are page numbers; the ABC's distinguish among items where more than one is on a page. There is a number on the coupon for each item referring to new products, equipment, and literature.

EDITORIAL ITEMS

For more data, circle number on coupon.

NEW PRODUCTS

Fertilizer improvement 28B
Foaming agent 28C
Quaternary ammonium compounds .. 28A
Sodium monofluorophosphate 27A

TECHINCAL LITERATURE

CHEMICALS

Alkaline Cleaning 48C
Industrial Chemicals 48A
Oils Chart 48B

EQUIPMENT

Automatic Controls 48H
Cooling Towers 48O
Couplings 48E
Di-Electric Constant Meter 48M
Electronic Air Cleaner 48I
Heat Transfer Equipment 48K
Industrial Instruments 48D
Pumps and Heat Exchangers 48J
Sanitary Sifters 48N
Shaft Couplings 48P
Sodium Zeolite Water Softener 48G
Stainless Tubing Steels 48L
Vacuum Coating Units 48F

PRODUCTS ADVERTISED

For more data, circle number on coupon

Chemicals

Ammonium bicarbonate ..... Ib
Ammonium bifluoride B1a
Ammonium chloride ..... Ia
Anti-skinning agents T44f
Aromatics, industrial T44a
Borax T1a
Boric acid T1b
Caustic potash Ic
Deodorants T44b
Detergents
Nacconol 21
Synthetic, for cement & plaster industries 49b
Synthetic, for cleaning & washing compounds 49c
Synthetic, for food & vegetable processing 49a
Synthetic, for transportation equipment washing 49d
Eicosane technical 22
Emulsifiers for agricultural chemicals, booklet 34b
Fatty acids, animal, hydrogenated 24
Fertilizer ingredients B1b
Fungicides T44d
Germicides T44c
Odor neutralizers 2b
Perfumes 2a
Pharmaceuticals 18
Potash persulphate B1c
Potassium carbonate ..... Id
Preservatives T44e
Sebacic acid 23
Sodium acetate 33
Sodium nitrite ..... Ie
Sorbitol 34c
Stearic acids, hysterne 34a
Sulphur 3
Sulphur hexafluoride 50
Coatings, protective, tar base 29
Containers, shipping sacks, paper, multiwall, custom made 32
Evactors, steam jet B26
Mineral resources 36b
Mist eliminators 25
Nameplates B28
Plant sites and industrial opportunities 36a
Trucks, dump 40
Waxes, gersthofen T26

SEARCHLIGHT SECTION

(Classified Advertising)

EQUIPMENT
(Used or Surplus New)
For Sale 46
WANTED
Equipment 46

ADVERTISERS INDEX

Consolidated Products Co., Inc. 46
First Machinery Corp. 46
Green Valley Fertilizer & Chemical Co., Ltd. 46
Jasper Machinery Co. 46
Perry Equipment Corp. 46

READER SERVICE COUPON

Mail to Chemical Industries Week, 330 W. 42nd St., N. Y. 18, N. Y.

NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

CITY & STATE _____

Editorial Items

27a	28b	48a	48c	48e	48g	48i	48k	48m	48o
28a	28c	48b	48d	48f	48h	48j	48l	48n	48p

Advertisements

Ia	Ie	B1b	3	23	B26	33	36a	T44b	T44f	49c
Ib	T1a	B1c	18	24	B28	34a	36b	T44c	49a	49d
Ic	T1b	2a	21	25	29	34b	40	T44d	49b	50
Id	B1a	2b	22	T26	32	34c	T44a	T44e		

Expires June 24, 1951

BOOKLETS . . . . . .

Chemicals

Industrial Chemicals
96-p. general catalog providing thorough data on the uses, product quality, and shipping information of each of company's chemicals comprising their line of alkalis, solvents, phosphates, magnesia products, barium products, agricultural products and other chemicals. An "Applications Index" lists the products according to their uses—both known and suggested. Westvaco Chemical Div., Food Machinery & Chemical Corp.

Oils Chart
24-p. bulletin covering more than 170 different materials including a variety of linseed, soybean, and fish oils, fatty acids, hydrogenated alcohols, glycerides, sperm oils and lecithin. Detailed specifications and suggested uses make this Oils Chart of interest to the chemist and formulator in the paint, soap, printing ink, lubricant and allied industries. Archer-Daniels-Midland Co.

Alkaline Cleaning
Booklet describing procedures to be followed for heavy-duty alkaline cleaning of ferrous metals, such as alkaline soak tank cleaning, spray cleaning, alkaline electrolytic cleaning, barrel cleaning, etc. Also included are recommendations for proper cleaners to be used for special purposes. Pennsylvania Salt Mfg. Co.

Equipment

Industrial Instruments
84-p. publication, "Instruments Accelerate Research" devoted to many types of equipment which, alone or in combination with other apparatus, are being used in research and analytical studies. Divided in three sections, the book covers analytical apparatus, precision laboratory measuring instruments and research apparatus components. Minneapolis-Honeywell Regulator Co.

Couplings
40-p. catalog made up of various loose-leaf company bulletins containing information, engineering data, dimensions, etc., on any particular type of fluid line coupling, either pressure or vacuum type, for pneumatic, hydraulic, oxygen, acetylene, steam or other applications. The Hansen Mfg. Co.

Vacuum Coating Units
Data sheet covering the construction, capabilities and performance of various vacuum coating units, with material charted so as to afford quick comparison of units as to utilities and approximate shipping weight and to give detailed information on particular characteristics. Distillation Products Industries.

Sodium Zeolite Water Softener
Bulletin explaining the sodium zeolite softening process, the factors involved in the selection of zeolite material, the data necessary for laying out this type of water softening plant plus a description of the four operational steps involved. Cochrane Corp.

Automatic Controls
Folder comprising firm's individual bulletins on electronic automatic controls; included are descriptions, specifications, diagrams and operational details of milk and food level controls, ice accumulation, liquid level, boiler feedwater and firing controls plus additional information on control accessories. Lumenite Electronic Co.

Electronic Air Cleaner
8-p. leaflet explaining in non-technical language the operation and construction of the Precipitron air cleaner for use in factories, stores, offices, and homes. Sturtevant Div., Westinghouse Electric Corp.

Pumps and Heat Exchangers
4-p. bulletin dealing with the design, advantages and applications of cast resin pumps and light-weight heat exchangers used for the transfer of corrosive liquids, hot or cold. Nukem Products Corp.

Heat Transfer Equipment
4-p. condensed catalog illustrating and briefly describing representative items in their line of heat transfer equipment, blenders and process vessels such as kettles, mixers, autoclaves, etc. Patterson-Kelly Co., Inc.

Stainless Tubing Steels
4-p. bulletin furnishing technical data on ten of the most popular austenitic and ferritic stainless tubing steels for engineers concerned with the design, fabrication and application of stainless tubing. The Babcock & Wilcox Tube Co.

Di-Electric Constant Meter
Bulletin describing the accuracy and operation of instrument for measuring the di-electric constant of liquids and for demonstrating the principles related to this property. Eberbach & Son Co.

Sanitary Sifters
4-p. bulletin discussing all-metal sifter with self-contained driving mechanism, designed for sifting dry free-flowing granular products in food and chemical processing operations. Allis-Chalmers Mfg. Co.

Cooling Towers
4-p. bulletin describing dry-fan blower type cooling towers and containing selection table for air conditioning and related applications in addition to typical temperature performance data. Binks Mfg. Co.

Shaft Couplings
4-p. bulletin on roller chain flexible shaft couplings giving engineering information for proper application such as dimensions, weights, service factors and horsepower ratings. Link-Belt Co.

ADVERTISER'S INDEX

American-British Chemical Supplies, Inc. 4
Atlantic Refining Co. 22
Atlas Powder Co. 34
Carbide & Carbon Chemicals Division, Union Carbide & Carbon Corp. 33
Croll-Reynolds Co., Inc. B26
Dempster Brothers, Inc. 40
Fritzsche Brothers, Inc. 2
General Chemical Division, Allied Chemical & Dye Corp. Back Cover
Hardesty Chemical Co., Inc. 23
Hardesty Co., Inc., W. C. 24
Hooker Electrochemical Co. 18
Kraft Bag Corp. 32
Lincks, Inc., George H. T26
McGraw-Hill Book Co., Inc. 45
Metal Textile Corp. 25
Meyercord Co., The B28
Millmaster Chemical Corp. B1
National Aniline Division, Allied Chemical & Dye Corp. 21
Norfolk & Western Railway 36
Oronite Chemical Co. . . . . 3rd Cover
Pacific Coast Borax Co. T1
Pittsburgh Coke & Chemical Co. 29
Sindar Corp. T44
Solvay Sales Division, Allied Chemical & Dye Corp. . . . 2nd Cover
Texas Gulf Sulphur Co., Inc. 3
United States Potash Co., Inc. T28

BUSINESS STAFF

SALES MANAGER . . . . . By Sawyer
BUSINESS MANAGER . . . . . Albert E. Weis

Atlanta . . . . . Ralph C. Maultsby, 1311 Rhodes-Haverty Bldg., Atlanta 3, Ga.

Chicago . . . . . Alfred D. Becker, Jr., Frank C. Mahnke, Jr., 520 N. Michigan Ave., Chicago 11, Ill.

Cleveland . . . . . Vaughan K. Dissette, 1510 Hanna Bldg., Cleveland 15, Ohio

Dallas . . . . . Jos. H. Allen, First Natl. Bank Bldg., Dallas 1, Texas

Los Angeles . . . . . Carl W. Dysinger, H. L. Keeler, 1111 Wilshire Blvd., Los Angeles 17, Cal.

New York . . . . . Knox Armstrong, Robert S. Muller, Charles L. Todaro, 330 West 42 St., New York 18, N. Y.

Philadelphia . . . . . William B. Hannum, Jr., Architects Bldg., 17th & Sansom Sts., Philadelphia 3, Pa.

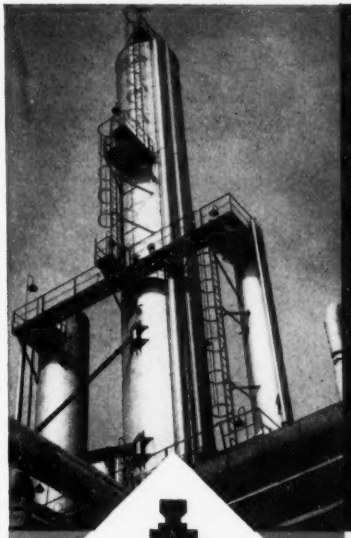
San Francisco . . . . . Ralph E. Dorland, John W. Otterson, 68 Post St., San Francisco 4, Calif.

Boston . . . . 1427 Statler Bldg., Boston 16

Detroit . . 2980 Penobscot Bldg., Detroit 26

Pittsburgh . . . 738 Oliver Bldg., Pittsburgh 22

St. Louis . . . 3615 Olive St., Continental Bldg., St. Louis 8



Background for better detergents

More than a billion pounds of household and industrial cleaning compounds have been produced with synthetic detergent materials made by Oronite.

This broad acceptance is proof of the high regard which leading compounders, processors and end-users hold for Oronite products.

Large-scale production facilities and experience provide Oronite the background for better detergents and make Oronite a most important source of supply.

ORONITE CHEMICAL COMPANY

THE NAME TO WATCH IN CHEMICALS

A partial list of other Oronite Chemicals

NOTICE
Some of the following are currently in short supply.

Detergent Alkane
Detergent Slurry
Detergent D-40
Detergent D-60
Wetting Agents
Lubricating Oil Additives
Cresylic Acids
Gas Odorants
Polybutenes
Sodium Sulfonates
Purified Sulfonate
Naphthenic Acids
Phthalic Anhydride
Ortho, Para Xylenes
Xylol
Aliphatic Acid
Hydroformer Catalyst

THESE EXTREMELY VERSATILE SYNTHETIC DETERGENTS FIND A WIDE VARIETY OF USES THROUGHOUT INDUSTRY

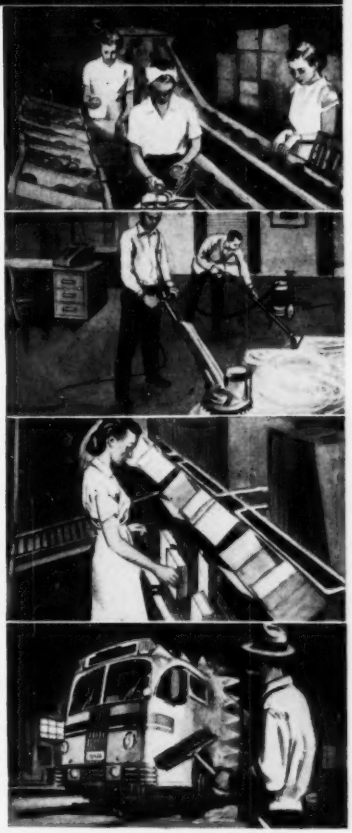
Four Examples:

1. FOOD AND VEGETABLE PROCESSING
A tremendous aid in washing, peeling and processing fruits and vegetables before canning or freezing. Improves their marketability and aids in the removal of dirt, insecticide and fertilizer residue.

2. UPHOLSTERING AND RUG CLEANING
These detergent products find widespread use in plant or "on-location" cleaning of rugs, carpets and upholstering. Excellent foaming qualities, easy rinsing and high efficiency in cleaning greasy type soil make them ideal for this purpose. Use them straight or in special compounds depending upon type of application.

3. CLEANING AND WASHING COMPOUNDS
Oronite supplies tremendous quantities of synthetic detergent materials to processors and compounders of packaged cleaners for all household and industrial uses.

4. TRANSPORTATION EQUIPMENT WASHING
Because of its fast action, quick rinsability and high detergency, Oronite D-40, either alone or in compounds, cuts cleaning and maintenance costs on trucks, trains, busses, passenger cars and other types of rolling stock.

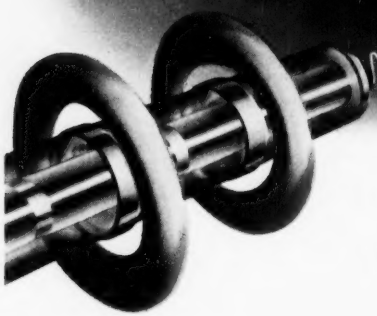


ORONITE CHEMICAL COMPANY

30 SANSOME STREET, SAN FRANCISCO 4, CALIF. — STANDARD OIL BLDG., LOS ANGELES 15, CALIF.
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y. — 600 S. MICHIGAN AVENUE, CHICAGO 5, ILL.
824 WHITNEY BLDG., NEW ORLEANS 12, LA.

The Remarkable New Dielectric Gas

SULFUR HEXAFLUORIDE SF_6



For Transformers—Co-axial Cables—

Capacitors—and other High Voltage Equipment.

Some practical advantages of Sulfur Hexafluoride:

1 Permits operation at higher voltages or lower pressures than are possible with air or nitrogen; i.e. increased voltage at the same pressure, or the same voltage at reduced pressure.

2 Reduces or eliminates corona.

3 Offers opportunity for simplified design and reduced dimensions of equipment; also lower construction and maintenance costs occasioned by lower pressure required.

4 Makes it possible to maintain voltages over greater distance in cables with lower power loss.

5 Has minimum permanent or cumulative effect in event of breakdown.

6 Is non-flammable.

SULFUR HEXAFLUORIDE

Formula: SF_6
Molecular Weight: 146.06
Melting Point: −50.8°C
Sublimation Temperature: −63.8°C
Critical Temperature: 45.6°C
Critical Pressure: 540 p.s.i.a.
Vapor Pressure:

Temp. (°C)	Pressure (p.s.i.a.)
−80	.5 (subl. press.)
−50	34
−20	102
+10	240
+40	481

60 cycle Dielectric Strength (tungsten rod and 1" diam. sphere, 1" spacing)

	Pressure, p.s.i.g. 0	10	20	30
Sulfur Hexafluoride, kilovolts	70	107	120	122
Nitrogen, kilovolts	13	17	21	25

WHEREVER A GASEOUS OR LIQUID DIELECTRIC has application, General Chemical Sulfur Hexafluoride merits prompt investigation. This remarkable new insulating gas has a dielectric strength comparable to that of mineral oil at moderate pressures! With it, operating efficiency can be stepped up in many types of electrical equipment, while overall construction and maintenance costs may often be lowered.

GENERAL'S Sulfur Hexafluoride is an extremely pure material that meets the most exacting dielectric requirements: it is remarkably inert; possesses exceptional thermal stability, and has a dielectric strength substantially higher than that of air or nitrogen.

BASIC CHEMICALS
GC
FOR AMERICAN INDUSTRY

For commercial quantities or more detailed technical information, consult General Chemical's Product Development Department. Please use business letterhead when writing.

PRODUCT DEVELOPMENT DEPARTMENT

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

Offices: Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport • Buffalo Charlotte • Chicago • Cleveland • Denver • Detroit • Houston • Jacksonville Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh • Providence San Francisco • Seattle • St. Louis • Yakima (Wash.)
In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.
In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver